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LARGE POWER PLANT EFFLUENT STUDY (LAPPES) VOLUME 4 - INSTRUMENTATION, PROCEDURES, AND DATA TABULATIONS (1971) AND PROJECT SUMMARY

Francis A. Schiermeier

Environmental Protection Agency
Research Triangle Park, North Carolina

November 1972

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Plate 1. Conemaugh plume, May 20, 1971, 0956 EST. Visible plume accomplished by means of intentional, limited flyash release.

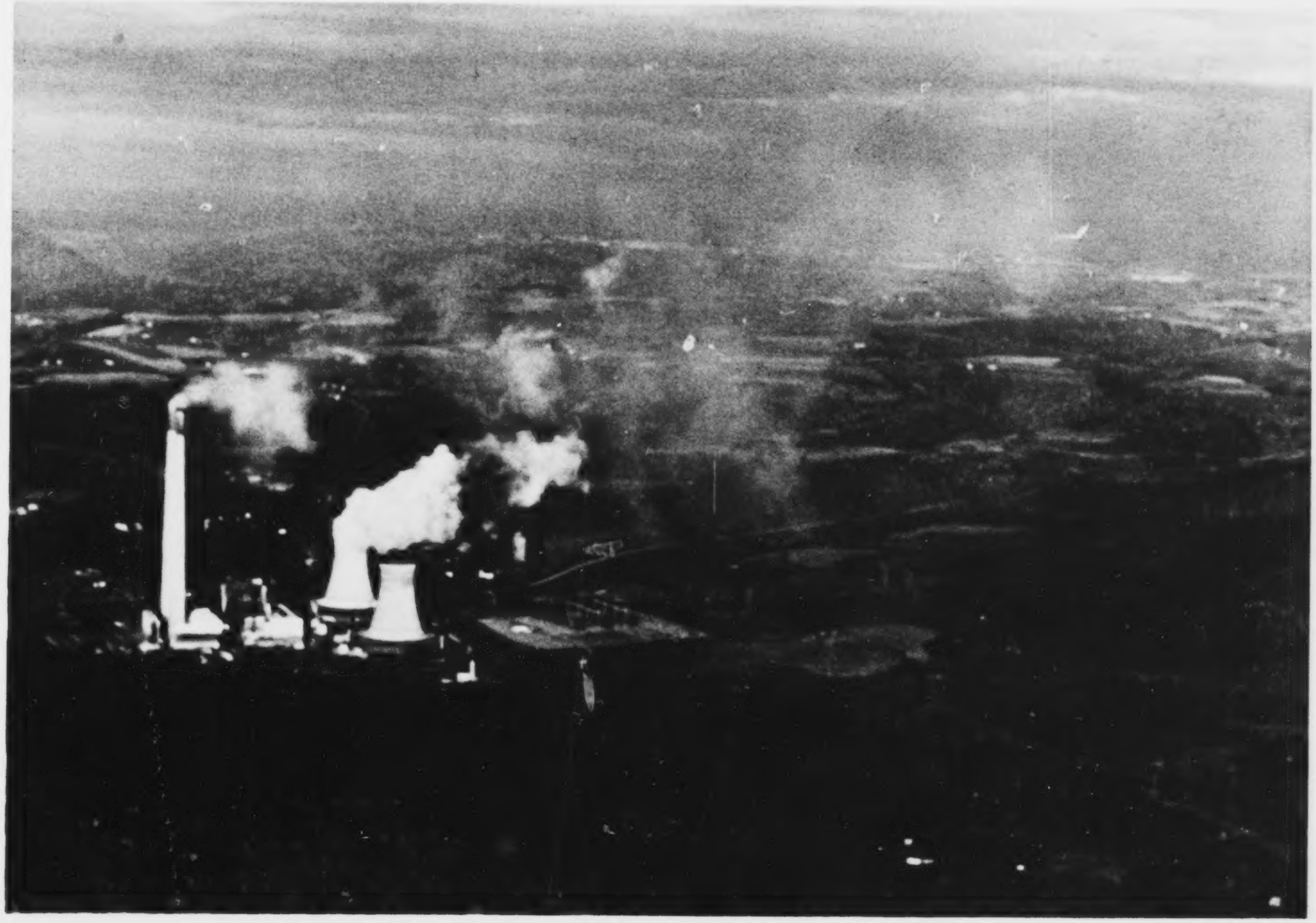

Plate 2. Conemaugh plume, November 4, 1971, 0735 EST. Visible plume accomplished by means of intentional, limited flyash release.

Plate 3. Conemaugh plume, April 21, 1971, 0745 EST. Visible plume accomplished by means of intentional, limited flyash release.

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Plate 4. Conemaugh plume, November 17, 1971, 0700 EST. Visible plume accomplished by means of intentional, limited flyash release.

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ENVIRONMENTAL PROTECTION AGENCY
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Research Triangle Park, North Carolina
November 1972

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The author is a meteorologist assigned to the National Environmental Research Center-Research Triangle Park, North Carolina, Environmental Protection Agency by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

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ABSTRACT

The Large Power Plant Effluent Study (LAPPES) was initiated during 1967 in western Pennsylvania to evaluate the extent and effects of air pollution resulting from the largest complex of coal-burning generating stations in the United States. During 1971 two series of LAPPES field experiments were conducted in areas surrounding the Conemaugh and Keystone Generating Stations; these experiments consisted of ground-based and airborne plume measurements supported by extensive meteorological observations. Part 1 of this volume describes the topography and climatology of the generating station complex, the sulfur dioxide and meteorological monitoring equipment, and experimental procedures. Part 2 presents tabulations of plant operational parameters and the air quality and meteorological data collected during 1971. Part 3 consists of a summary of the entire LAPPES project; included are series tabulations of air quality and meteorological data collected by LAPPES personnel from 1967 through 1971 and descriptions of contractor participation and the LAPPES vegetative study.

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INTRODUCTION

Cognizant of the need for clean air, the electric power industry in many instances has adopted the tall stack in its endeavor to maintain reasonable air quality at ground-level surrounding generating stations of ever increasing capacity. Considerable debate is underway, however, on both the national and international scene regarding the effectiveness and performance of these stacks in overall pollution management. Questions raised by health and air pollution control agencies regarding the potential effects of airborne effluents from these plants cannot be answered in a definitive way by simply extrapolating experience with existing smaller-capacity installations. Accordingly, the Environmental Protection Agency (EPA) has conducted a 5-year comprehensive field study to determine the extent and effects of power plant emissions from tall stacks. Specifically, three objectives were pursued at the Western Pennsylvania site:

1. To develop and validate transport and diffusion models with which to calculate ground-level concentrations of effluents from large power plants with tall stacks.

2. To measure the magnitude, frequency, and spatial distribution of ground-level concentrations from large power plants with tall stacks, singly and in combination, and to compare the observed data with calculated predictions.

3. To evaluate the effects of sulfur compounds and other effluents from a large power plant complex on vegetation in the region of the installations.

The LAPPES project was sponsored by the Environmental Protection Agency, with field activities conducted by on-site personnel. Office facilities were maintained at Jimmy Stewart Airport in Indiana, Pennsylvania. Also cooperating in the study were the Pennsylvania Electric Company and the Division of Air Pollution Control of the Pennsylvania State Department of Health. During the 1971 field experiments, additional contract participation was provided by Brookhaven National Laboratory.

LAPPES consisted of two complementary efforts, the first concerned with meteorological and air quality measurements and the second with agricultural effects data. The meteorological portion of the study was conducted along three interrelated lines of investigation: (1) determination of plume rise under a variety of atmospheric conditions; (2) determination of plume dispersion, both vertical and horizontal, as a function of downwind distance and atmospheric conditions; and (3) determination of the magnitude, areal extent, and occurrence frequency of sulfur dioxide concentrations at ground level after emission from tall stacks. The agricultural or vegetative segment of LAPPES attempted to evaluate effects of power plant emissions on the agricultural economy of the adjacent region, which consists largely of Christmas tree plantations.

The purpose of this volume is to present the meteorological and air quality data collected during 1971 in support of the first two LAPPES objectives and to present a summary of the entire LAPPES project. Specifically, Part 1 describes the power station complex and the equipment, procedures, and techniques used in conducting field experiments, in measuring air quality and meteorological parameters, and in reducing and processing data. Part 2 presents tabulations of the basic data and pertinent supplementary data collected during 1971. Part 3 summarizes the various types of air quality and meteorological data collected by LAPPES personnel from 1967 through 1971 and describes contractor participation and the LAPPES vegetative study.

This volume is not intended to present analyses of the data, to evaluate existing plume rise and dispersion theories, or to develop new diffusion models; these objectives have been pursued in related papers (Niemeyer et al., 1970; Pooler and Niemeyer, 1970; Schiermeier, 1971a) and will receive additional treatment in future work. Previous publications dealing with LAPPES include a general description of the project goals and activities (Niemeyer and Schiermeier, 1969) and three volumes containing data collected during similar field studies conducted around the Keystone, Homer City, and Conemaugh Generating Stations from 1967 through 1970 (Schiermeier, 1970; Schiermeier, 1971b; Schiermeier and Niemeyer, 1970).

PART 1 - INSTRUMENTATION AND PROCEDURES

POWER PLANT DESCRIPTION

The largest complex of coal-burning generating stations in the United States has emerged in the Chestnut Ridge area of Western Pennsylvania shown in Figure 1. Three new mine-mouth stations, Keystone, Homer City, and Conemaugh, are located approximately equidistant along a NW-SE line 39 kilometers long about 80 kilometers ENE of Pittsburgh. These three plants, combined with the nearby Seward and Shawville Stations, form a complex whose total annual production of 47,380,505 megawatt-hours exceeds the total yearly electrical output of all but 11 nations of the world. The five stations, owned by a total of 12 electric utilities, are fed from coal mines located either directly under or close by the station sites.

The subject of LAPPES was the line of sources formed by the Keystone, Homer City, and Conemaugh Stations, whose stacks emit a combined daily output approaching 2000 metric tons of sulfur dioxide into the atmosphere. A distinct advantage of this location for the study is that air quality measurements progressed as each stack of each station became operational. The 1967 and 1968 LAPPES field studies were conducted in an area surrounding the Keystone Station. Beginning in 1969, the project area was expanded to encircle the Homer City Station as it became operational, with similar expansion effected in 1970 to include the Conemaugh Station.

In the following description of the power station complex, generating capacities are based on design specifications. These optimum plant loads have been temporarily downrated to allow for necessary equipment modifications but should be restored to their original levels in the near future. This slight decrease in plant rating has no effect on the data contained herein because existing hourly plant loads are included in Table 12 for the periods of plume sampling.

Keystone Station

The Keystone Generating Station, located just west of Shelocta, was the first of the three new mine-mouth stations to be completed (Figure 2). The station has an hourly generating capacity of 1.55 x 10^{12} calories (1800 megawatts) produced by two identical cross-compound turbine-generator units. The boilers, which hourly produce 1.81 x 10^{12} calories, consume 590 metric tons of pulverized coal per hour supplied by conveyor and truck from nearby mines. Four 99-meter-tall natural-draft cooling towers are used to provide recirculating water for steam condensation. The towers are designed to collectively cool 21.2 x 10^5 liters of water per minute from 48°C to 32°C with a total evaporation rate of 34,000 to 49,000 liters per minute.

Boiler effluent is fed to the twin 244-meter-tall stacks after passing through two electrostatic precipitators per unit. The precipitators, with an efficiency rating of 99.5 percent, remove a combined total of 83 metric tons of flyash hourly. Each stack includes a 9.5-mm-thick steel liner that maintains a constant outside diameter of 11.0 meters from the base to a height of 27 meters, and a diameter of 8.3 meters from a height of 58 meters to stack top; the taper from 11.0 to 8.3 meters occurs between 27 and 58 meters above the base. Surrounding the liner is a concrete shell tapering from an outside base diameter of 20.4 meters to 10.4 meters at the top. Separation between stack centers is 61.9 meters, and the inside (exit) diameter at the top is 8.29 meters. Orientation of the stacks is along a line 044°-224° from north.

Unit 1 of the Keystone Station went into commercial operation during August 1967; unit 2 followed in July 1968 (Estrada and Smith, 1964; Penelec, 1971).

Homer City Station

Second in line is the Homer City Station, which is located about 4 kilometers SSW of the Homer City Borough (Figure 3). The station is capable of generating 1.10×10^{12} calories hourly (1280 megawatts) by means of two tandem-compound turbine-generator units. The boilers produce 1.28×10^{12} calories an hour while consuming 420 metric tons of finely ground coal supplied by conveyor from two nearby mines. Two 119-meter-tall natural-draft cooling towers provide recirculating water to condense steam back into boiler water. Approximately 15.7×10^5 liters of water are cooled from 49°C to 32°C each minute; total evaporation rate is 30,000 to 42,000 liters per minute.

Boiler effluent reaches the two 244-meter-tall stacks after passing through four electrostatic precipitators that remove a total of 71 metric tons of flyash hourly. Each chimney includes a 6.35-mm-thick steel liner that tapers from 10.0 meters outside diameter at the base to 7.3 meters at a height of 55 meters; the top 189 meters of the liner maintains a constant outside diameter of 7.3 meters. Surrounding the liner is a concrete shell tapering from an outside base diameter of 19.1 meters to 9.5 meters at the top. Separation between stack centers is 53.0 meters, and the inside (exit) diameter at the top is 7.29 meters. Orientation of the stacks is along a line 160°-340° from north.

The Homer City Station is so designed that a third unit with associated stack and cooling tower may be added if required. Unit 1 went into commercial operation during July 1969; unit 2 followed in December 1969 (Penelec, 1971).

Conemaugh Station

The third new generating station, Conemaugh, is situated at the village of Huff on the Conemaugh River (Figure 4). The Conemaugh Station is the near twin of Keystone, with identical boiler production and coal consumption. Also similar is the hourly generating capacity of 1.55 x 10^{12} calories (1800 megawatts). Because of their larger size and capacity, however, only two cooling towers, each 113 meters tall are required. Approximately 21.2 x 10^5 liters of water are cooled from 48°C to 32°C each minute to provide recirculating water for steam condensation; total evaporation rate is 34,000 to 49,000 liters per minute.

The Conemaugh Station is similarly equipped with precipitators that will ensure removal of up to 100 metric tons of flyash hourly from the boiler effluent. The two 305-meter stacks are constructed of a 22.2-mm-thick steel liner encased in a tapered concrete shell ranging from an outside base diameter of 25.3 meters to a top diameter of 10.3 meters. The steel liner maintains a constant diameter of 11.0 meters from the base up to a height of 27 meters, and 8.3 meters from a height of 58 meters to stack top; the taper from 11.0 to 8.3 meters occurs between 27 and 58 meters above the base. Separation between stack centers is 61.9 meters, and the inside (exit) diameter at the top is 8.29 meters. Orientation of the stacks is along a line 101°-281° from north.

Unit 1 of the Conemaugh Station went into commercial operation during May 1970; unit 2 followed in May 1971 (Penelec, 1971).

TOPOGRAPHY AND GENERAL CLIMATOLOGY

As shown by the topographic map in Figure 5, the generating stations are located in the Chestnut Ridge sector of the Allegheny Mountains. Typical of this area of Pennsylvania are numerous creeks and rivers, and rolling hills rising 100 to 200 meters above the valley floors. The land, much of which is tree covered, slopes generally upward to the east to form the foothills of the Allegheny Mountains. Prominent features include Chestnut Ridge, oriented NE-SW and situated between the Homer City and Conemaugh Stations, and the considerably higher Laurel Ridge immediately southeast of the Conemaugh Station.

The Keystone Station is situated in a shallow rural valley with stack base elevation at 305 meters above mean sea level (MSL). Except for this valley, the surrounding terrain within 5 kilometers is hilly, with the tallest peaks attaining approximately mid-stack height. Influences of large-scale topography are not evident from past ground-level measurements of Keystone emissions, although there may be some subtle effects that could appear during further analyses of the data.

The Homer City Station is located on a plateau with much of the surrounding terrain at approximately the same elevation as stack base at 366 meters MSL. To the east of the plant is a drop of about 100 meters to a valley, on the opposite side of which is Chestnut Ridge, with peaks ranging slightly higher than mid-stack. East of the ridge is a plateau that received higher SO_2 concentrations at ground level than were found at comparable distances in other directions from the Homer

City Station. This appeared to be caused in part by a lee effect and was not attributable solely to the elevation of the plateau.

The Conemaugh Station is most susceptible to topographic influences. Separating this plant from Johnstown is the Laurel Ridge with some peaks within 6 kilometers ranging up to 200 meters above stack top. Stack base elevation at this plant is 329 meters MSL. During the October 1970 series, and to a lesser extent during the October 1971 series, helicopter and ground-based measurements confirmed the unique dispersion characteristics in the area. With moderate to strong flow from the southeast quadrant, the plume was brought to the surface within a very short distance; on one occasion, it appeared to descend onto the generating station itself. The SO_2 concentrations rapidly diminished with distance to the northwest but increased slightly on the lee side of Chestnut Ridge, about 12 to 14 kilometers from the Conemaugh stacks. In addition to ground-level SO_2 measurements, this downwash on the lee side of Laurel Ridge was confirmed by actual subsidence of pilot balloons in the vicinity of the Conemaugh stacks.

Accompanying this downwash phenomenon was a persistent cloud cover over the Conemaugh Station, caused by upslope action over Laurel Ridge. Observed cloud bases varied between 450 and 650 meters above stack base elevation with coverage ranging from scattered to overcast, although usually broken. This cloud deck frequently extended as far northwest as Chestnut Ridge, with clear skies beyond. The lee downwash appeared to be associated with neutral flow because on days when the cloud cover dispersed sufficiently to allow surface heating, the downwash ceased and the plume rose in a normal manner.

With winds from the opposite direction, i.e., the northwest quadrant, the plume rose over Laurel Ridge and apparently mixed through a deep layer in the lee of the ridge; relatively low concentrations were measured from ground level to the upper limit of sampling imposed by cloud bases. If a lee-wave phenomenon exists with northwest winds, it has not been detected by our sampling methods.

During the April 1971 series, the Conemaugh plume was discovered to be intercepting ridges at considerable distances from the plant (11 to 20 kilometers) and flowing smoothly down the lee side for about 1 or 2 kilometers before rising again. That this phenomena was not confined to a particular wind direction was evidenced by the various azimuths of occurrence, 275°, 327°, 353°, and 060°. Two meteorological characteristics common to all four occurrences were the presence of strong surface inversions near the Conemaugh Station shortly after sunrise and the sudden disappearance of the high ground-level SO_2 concentrations in the lee of the ridges as surface heating commenced.

The area of study has a humid, continental type of climate modified slightly by its nearness to the Atlantic Seaboard and the Great Lakes. Summers are mild but frequently humid because of invasions of air from the Gulf of Mexico. Winters are reasonably brisk with occasional periods of extreme cold; spring and fall months have moderate to cool temperatures. Precipitation is well distributed throughout the year, with appreciable snowfall in winter and the maximum frequency of thunderstorms in early summer.

Surface inversions are relatively frequent during the warmer months of the year; in winter, however, cloudiness persists because of this area's proximity to the track of west-east migratory storms and the frequent showery weather associated with northwest winds across the Great Lakes. Cold air drainage induced by the many hills leads to frequent formations of early morning fog, which may be quite persistent in the deeper valleys during the colder months. The study area is also subject to relatively frequent occurrences of stagnating anticyclones, a condition conducive to high, ambient pollution levels because of the resulting poor ventilation.

HELICOPTER INSTRUMENTATION *

The primary source of airborne plume and meteorological measurements was an instrumented Bell model 47J2 helicopter. The instrument package was designed and fabricated by Sign X Laboratories of Essex, Connecticut, and provided the observer with continuous, near-instantaneous measurements of sulfur dioxide and pressure height on the top recorder, and temperature and wet-bulb depression on the bottom (Figure 6). A description of the system follows (Sign X, 1970):

1. Sulfur dioxide: electroconductivity method with time constant of 2.0 to 2.5 seconds; four ranges with full scale 1.0, 5.0, 10.0, or 50.0 ppm; flow rate of air sample, 2500 cc/min; flow rate of reagent, 25 cc/min; temperature compensation in analytical cell of 2.0 percent per degree C based on 25°C; sulfur dioxide removal from reagent (distilled water) accomplished by ion exchange resin.
2. Pressure height: double bourdon cell with time constant of 0.1 second; electrical output linear function of pressure height according to standard atmosphere; four overlapping scales with 200 meters = 25.4 mm (1.0 inch) on chart.
3. Temperature: thermistor with time constant of 0.1 to 0.2 second; three overlapping scales with 4°C = 25.4 mm (1.0 inch) on chart.
4. Wet-bulb depression: thirty-junction thermopile with time constant of 0.1 to 0.2 second; one scale with 4°C = 25.4 mm (1.0 inch) on chart.
5. Sulfur dioxide scrubber: manually operated, water- and resin-activated; two identical inline tubes provided equivalent pressure drop whether scrubbing or sampling directly.

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*Mention of commercial products or company names does not constitute endorsement by the Environmental Protection Agency.

6. Recorders: Hewlett Packard Model 7100B; two-channel with plug-in modules; full scale for each pen equivalent to half chart width with 2.54-mm vertical pen displacement to prevent collision in the event of overlap; one minute marker and one event marker on each recorder; chart speed = 25.4 mm (1.0 inch) per minute.

The instrument package was mounted in the left passenger cockpit position, facing the observer, so that continuous monitoring of all four parameters could be maintained (Figure 7). Power was supplied by the aircraft 24-volt DC power supply, subsequently converted to 115 volts AC by means of a Topaz static inverter contained in the baggage compartment.

The pressure-height sensor, attached to the lower right brace of the instrument package, was connected by means of Teflon tubing to the static line of the helicopter airspeed indicator. The remaining three sensors were externally mounted on the left skid (Figure 8). The temperature and wet-bulb depression sensors were located respectively fore and aft in the 75-mm-diameter cylinder with the reservoir for the wet-bulb occupying approximately one-fourth the inner volume. The air intake to the SO_2 analyzer was a 3.17-mm-interior-diameter (ID) Teflon tube inserted into the trailing edge of the 1.8-meter-long, 22.2-mm-ID steel pipe attached to the skid.

With an airflow of 2500 cc/min into the analyzer and a Teflon orifice in the probe of 1.19-mm ID, the isokinetic sampling speed for this unit was calculated as 24.3 mps. Actual flights were conducted at 22.4 mps (50 mph) during 1971. Disturbance of air at the sampling inlets by downwash from the helicopter rotor occurred only when the craft was hovering and not during forward flight. Communication between the airborne observer and ground-based sampling teams was accomplished by means of Motorola Motrac FM two-way radios.

SULFUR DIOXIDE INSTRUMENTATION

Portable Bubblers

The portable bubblers used to measure ground-level SO_2 concentrations under the plume were constructed by EPA personnel and designed to obtain six consecutive 30-minute samples (Figure 9). The units were powered by 7.5-volt batteries and maintained an average flow rate of 150 cc/min. Each of the six sampling tubes per bubbler contained 20 ml of West-Gaeke solution through which ambient air was drawn by a 200-cc/min-capacity pump driven by a 6-volt motor. Additional tubes containing glass wool were installed downstream to prevent moisture from entering the pump assembly.

Switching between sampling tubes was accomplished by means of a synchronous timing motor and sequential valve. Because the sampling probe was only 15 cm above ground when operating, Millipore filters were inserted near the inlets to prevent admission of particulate matter. Analyses of bubbler samples were performed on a Technicon AutoAnalyzer.

Technicon AutoAnalyzer

The LAPPES office at Jimmy Stewart Airport was equipped with a Technicon AutoAnalyzer that served the dual purpose of analyzing bubbler samples and monitoring ambient SO_2 (Figure 10). The SO_2 was measured colorimetrically, using West-Gaeke solution as the absorbing reagent, with sulfamic acid added to depress interference from nitrogen dioxide. Components of the AutoAnalyzer included a sampler, proportioning pump, heating bath, programmer, and colorimeter-recorder.

When this AutoAnalyzer was used for on-stream monitoring, the flow rates of air and West-Gaeke solution through the absorbing column were 1 liter/min and 1.5 cc/min respectively. Ambient air was drawn through Teflon tubing from the intake on the office roof, 12 meters above surface; a Millipore filter was used to screen out airborne particulate matter. When the instrument was used to analyze bubbler samples, the intake line from the absorbing column was switched to the sampler turntable where bubbler reagent was contained in individual sample cups.

The transmittance of the colored complex was measured at 572 mμ with a 50-mm flow cell in the colorimeter. Calibration curves for data reduction were computed by analyzing standards each time new reagents were prepared (Technicon, 1966).

METEOROLOGICAL INSTRUMENTATION

Fixed Network at Jimmy Stewart Airport

Several meteorological variables were routinely monitored at Jimmy Stewart Airport to provide supplementary data for LAPPES experiments; these included wind speed and direction, temperature, relative humidity, hourly precipitation, and solar radiation (Figure 11). The surface elevation for these observations was 427 meters MSL, which corresponded to mid-height of the Keystone stacks, one-quarter height of the Homer City stacks, and one-third height of the Conemaugh stacks.

The Aerovane wind transmitter was mounted on a 10-meter tower as shown in Figure 11. Because of a nearby active runway, the FAA required that the tower be erected within 25 meters of the two-story office building. Winds from the quadrant centered on 090° may have been affected by the obstruction and should be so regarded in the ensuing data summary.

The Aerovane was equipped with a six-bladed impeller whose starting speed was about 0.7 mps; wind direction was sensed by the streamlined vane. Values for the wind speed and direction were electrically transmitted, and recorded continuously on a two-channel recorder. Range of wind speed was 0 to 44.7 mps (0 to 100 mph) on one channel; range of wind direction was 540 degrees of azimuth, allowing for crossover, on the other channel. Speed of chart rotation was 76.2 mm (3.0 inches) per hour.

Hourly temperature and relative humidity values were obtained from a standard National Weather Service hygrothermograph positioned in a louvered "cotton-region type" shelter. Maximum and minimum thermometers and a sling psychrometer were used to maintain calibration on the hygrothermograph. Precipitation totals were obtained from a weighing-bucket rain gage with verification provided by a standard 20.32-cm (8-inch) gage.

An Eppley pyranometer provided hourly values of total sun and sky radiation. Measurements were produced as a result of a voltage difference between two exposed concentric rings, one painted with lampblack, the other smoked with magnesium oxide. A continuous record was maintained by means of a Leeds and Northrup Speedomax H recorder. Full pen displacement was equivalent to 2.0 Langleys per minute, while the speed of chart rotation was 50.8 mm (2.0 inches) per hour.

Special Observations

Radiosonde Releases - In support of the airborne and ground-based plume and meteorological measurements, free radiosondes were released twice daily during selected experimental periods from Jimmy Stewart Airport. A 100-gram pilot balloon inflated to about 1100 grams lift carried the 403-megacycle package aloft at a rate of about 300 meters/min (Figure 12). Transmissions of pressure, temperature, and humidity were recorded on a 403-megacycle receiver using a manually-operated parabolic antenna, while visual tracking by theodolite provided winds aloft data (rabal). Both receiver and theodolite monitoring were terminated at 700 millibars.

Pilot Balloon Ascents - Winds aloft were routinely measured during experiments at the Conemaugh and Keystone Stations by double-theodolite observations of helium-filled pilot balloons. Inflation of 30-gram sounding balloons to about 45 grams lift provided an ascension rate of approximately 130 meters/minute through the 1500-meter observational layer. The use of a balloon inflated to a specific ascension rate permitted single-theodolite operation in the event one of the stations lost the balloon in flight or experienced instrument or communication malfunction.

Observations were obtained by means of standard Warren-Knight Model No. 85 theodolites positioned at the end of baselines ranging in length from 283 to 552 meters. Several baselines were established at each generating station to ensure adequate angular separation between simultaneous instrument readings and minimum steam plume interference for a wide range of wind directions. Except when prematurely obscured by clouds or steam plumes, the balloons were tracked for 10 minutes, with azimuth and elevation angles read at 30-second intervals. Communication between the two theodolite sites was maintained by E. F. Johnson Personal Messenger, all-transistor, battery-powered transceivers.

OPERATING PROCEDURES FOR LAPPES EXPERIMENTS

Airborne measurements of the Conemaugh and Keystone plumes during 1971 were obtained during two separate flight periods designated as the April 1971 and October 1971 series respectively. Unless prevented by plant shutdown, helicopter malfunction, or adverse weather, helicopter flights were conducted every day during these periods. Adverse weather for this type of experiment included ceilings lower than the plume, excessive ground fog, or strong turbulence caused by high winds; rain or snow alone did not curtail the flights. To permit visual observation of the plume, Pennsylvania Electric Company personnel reduced precipitator efficiency to allow limited flyash release during periods in which experiments were conducted.

Usually two flights, each lasting about 150 minutes, were made on a series day. The first commenced at dawn while the plume was normally isolated from the ground by stable atmospheric layers near the surface. This flight consisted of one to three cross sections preceded and followed by a 1000-meter vertical temperature profile just upwind of the Conemaugh or Keystone stacks. The cross sections were made at 4-, 10-, and 16-kilometer arcs downwind and consisted of successive crosswind flights through the plume at 60-meter vertical intervals; occasionally 30-meter intervals were flown to better define the top and bottom edges. The first traverse of each cross section was made approximately midway between top and bottom, with successively higher traverses until the top was reached; then lower from the center until the bottom was completed. In some cases this procedure was reversed so that the lower half of the plume was flown first. By maintaining a constant forward speed of 50 mph and by indicating surface reference points during plume passage, the geometry of the plume may be reconstructed.

The second flight of a series day began simultaneously with the normal temperature transition during which the layer in which the plume was imbedded was brought to the ground. In addition to obtaining two or three more temperature profiles, the helicopter was flown parallel and normal to the plume's longitudinal axis near the surface to obtain the x and y dimensions of ground-level SO_2 concentrations. This treetop-level flight was usually continued as long as fuel permitted unless the ground-level concentrations originating from the plume terminated sooner. Occasionally a third flight was executed during the afternoon to measure the effects of a looping plume or the sustained downwash from a limited mixing layer regime. If no ground-level concentrations occurred on a particular day, the second flight was sometimes used to repeat one or more cross sections. All plume cross-section and crosswind ground-level traverses were flown in the shape of arcs centered on the Conemaugh or Keystone stacks. Helicopter positions during airborne sampling were monitored and recorded by means of an on-board set of 7.5-minute-quadrangle topographic maps (USGS, 1971).

Helicopter measurements of ground-level concentrations were complemented with a series of consecutive 30-minute samples made by ten bubblers on the ground beneath the plume. Placement of these portable units was dependent on helicopter location of the plume aloft, and usually spanned the expected lateral projection to the ground, of the plume aloft, ranging from near the plant to as far out as 28 kilometers. On days of drastic plume shift, as determined from helicopter observation prior to inversion breakup, the bubblers which had already been set out were not analyzed when it was obvious that they were not influenced by the plume.

Prior to and after the daily airborne operations, radiosondes were released at Jimmy Stewart Airport. Although detailed helicopter temperature measurements revealed the stability through the plume's vertical extent, the radiosondes detected such other pertinent features as subsidence inversions aloft. In addition, these radiosonde releases will provide a means of comparing the climatology of Pittsburgh with that of the immediate area. Between these two releases, double-theodolite pibals were taken every 30 minutes at the Conemaugh or Keystone Station to provide data on the wind directly affecting plume dispersion.

SELECTED PLUME PHOTOGRAPHS

To assist in the physical interpretation of data contained in Part 2 of this volume, four selected plume photographs are presented in Plates 1 through 4. Vertical stability and wind data for these cases may be found in Tables 8, 9, and 10, and dimensions of the plumes are depicted in Table 3. In all four photographs, a visible plume was produced by means of intentional, limited flyash emission.

Plate 1 depicts the Conemaugh plume under very light wind conditions, with unit 1 operating at full capacity (900 megawatts). The first cross section of the morning revealed a plume width at 4 kilometers downwind of 129° or 9.0 kilometers. Two hours later, at the time of this photograph, the plume had backed about 75° and had narrowed to approximately one-half its former width. The limited vertical extent of the SO_2 plume was caused by a stable layer aloft based about 700 meters above stack base elevation and including a 0.8°C inversion between 735 and 950 meters. Subsequent helicopter flights detected ground-level SO_2 concentrations on both sides of Laurel Ridge to 26 kilometers downwind, while portable bubblers provided coverage of the looping plume close to the generating station.

Dispersion of the Conemaugh plume across Laurel Ridge under near-neutral stability and moderate-to-high wind speeds is shown in Plate 2, taken from 4 kilometers downwind. Vertical mixing of the SO_2 plume was confined between the surface and a stable layer aloft based about 1050 meters above stack base elevation. This restriction on vertical dispersion was responsible for the fairly high ground-level SO_2 concentrations measured by the helicopter on both sides of Laurel Ridge out to

16 kilometers. When this photograph was taken, unit 2 at the Conemaugh Station was operating near 83 percent of rated capacity.

Plate 3 illustrates the behavior of the Conemaugh plume while crossing the Conemaugh Gorge under moderate wind, stable conditions. The photograph is oriented so that the viewer is looking NNW, parallel with the gorge; the location of the peak at upper left is 100°/7.5 kilometers from the Conemaugh stacks. The subsidence of the SO_2 plume as it crosses the gorge after traversing Laurel Ridge dramatizes the lee wave effect described in Part 1 under Topography and General Climatology. On four separate occasions during the April 1971 series, the stable Conemaugh plume was discovered to be intercepting distant ridges and flowing smoothly down the lee side for 1 or 2 kilometers before rising again. On the day depicted in Plate 3, the bottom of the 10 kilometer cross section was at the surface in the lee of Laurel Ridge although the SO_2 concentrations were not as high as in the four above-mentioned cases. At the time of the photograph, units 1 and 2 of the Conemaugh Station were operating at 100 and 60 percent capacity respectively.

Plate 4 presents the Conemaugh plume from a vantage point about 10 kilometers downwind. The plume, emitted from unit 2 operating at 89 percent of rated capacity, is contained within a surface-based stable layer which extends beyond 1250 meters above stack base elevation. This limited vertical extent combined with extreme width (15.2 kilometers at 10 kilometers downwind) are characteristic of a fanning plume; the horizontal dispersion in this case is further enhanced by light air flow accompanied by oscillating directions. Four hours after this photograph was taken, the plume had narrowed to 5.2 kilometers at 10 kilometers downwind, about one-third its original width. Interestingly, the centerline remained in exactly the same location; the plume had narrowed 28° and 29° on the right and left sides respectively. Subsequent helicopter flights revealed high ground-level SO_2 concentrations out to 34 kilometers during inversion breakup and out to 38 kilometers under a limited mixing layer which persisted through the entire day.

CONTRACT PARTICIPATION IN LAPPES PROJECT

In addition to observations by EPA personnel, one contractor, Brookhaven National Laboratory, participated in the LAPPES Project during 1971. During May, October, and November 1971, Brookhaven personnel used a fixed-wing aircraft to procure measurements pertaining to plume geometry and plume chemistry. By means of an on-board densitometer using right-angle scattering with maximum sensitivity at 0.6 microns, flyash particles in the 0.01- to 10-micron diameter range were detected during successive crosswind flights downwind, thus providing a means of defining plume geometry. In support of efforts to determine SO_2 reactions in the plume aloft, controlled amounts of sulfur hexaflouride (SF_6) were released into the stack effluent. Evacuated flasks fitted with critical orifices were used for airborne collection. In order to obtain crosswind integrated values of SF_6, one continuous sample was obtained during each horizontal plume traverse. Subsequent gas chromatograph analyses of the samples will provide data with which simultaneous airborne SO_2 measurements can be compared and chemical reactions determined.

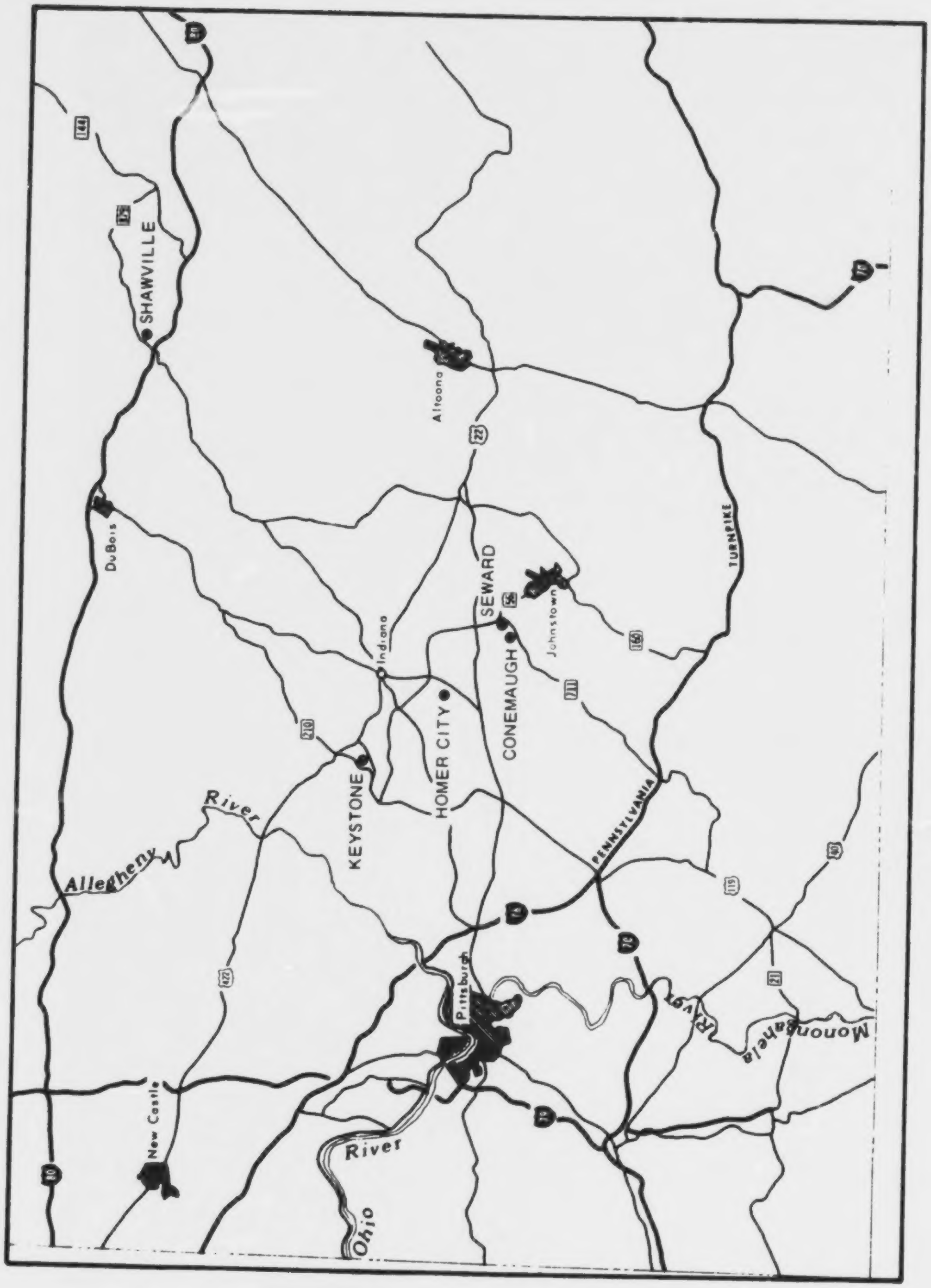

SHAWVILLE
DuBois
Altoona
Indiana
KEYSTONE
HOMER CITY
SEWARD
CONEMAUGH
Johnstown
Pittsburgh
New Castle
Allegheny River
Ohio River
Monongahela River
PENNSYLVANIA TURNPIKE
80
144
322
22
56
160
711
210
422
119
40
21
70
76
79

Figure 1. Locations of generating stations.

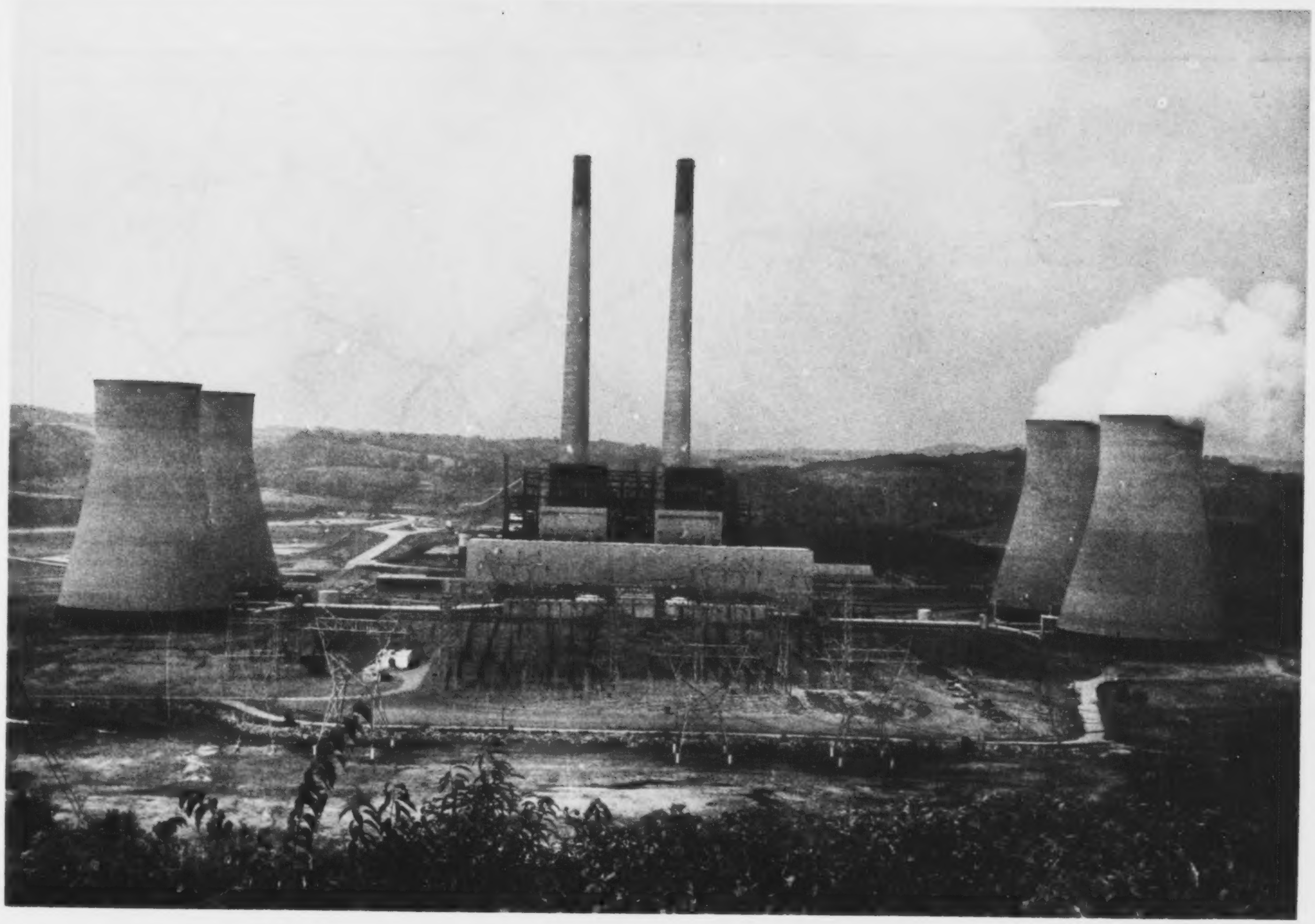


Figure 2. Keystone Generating Station.

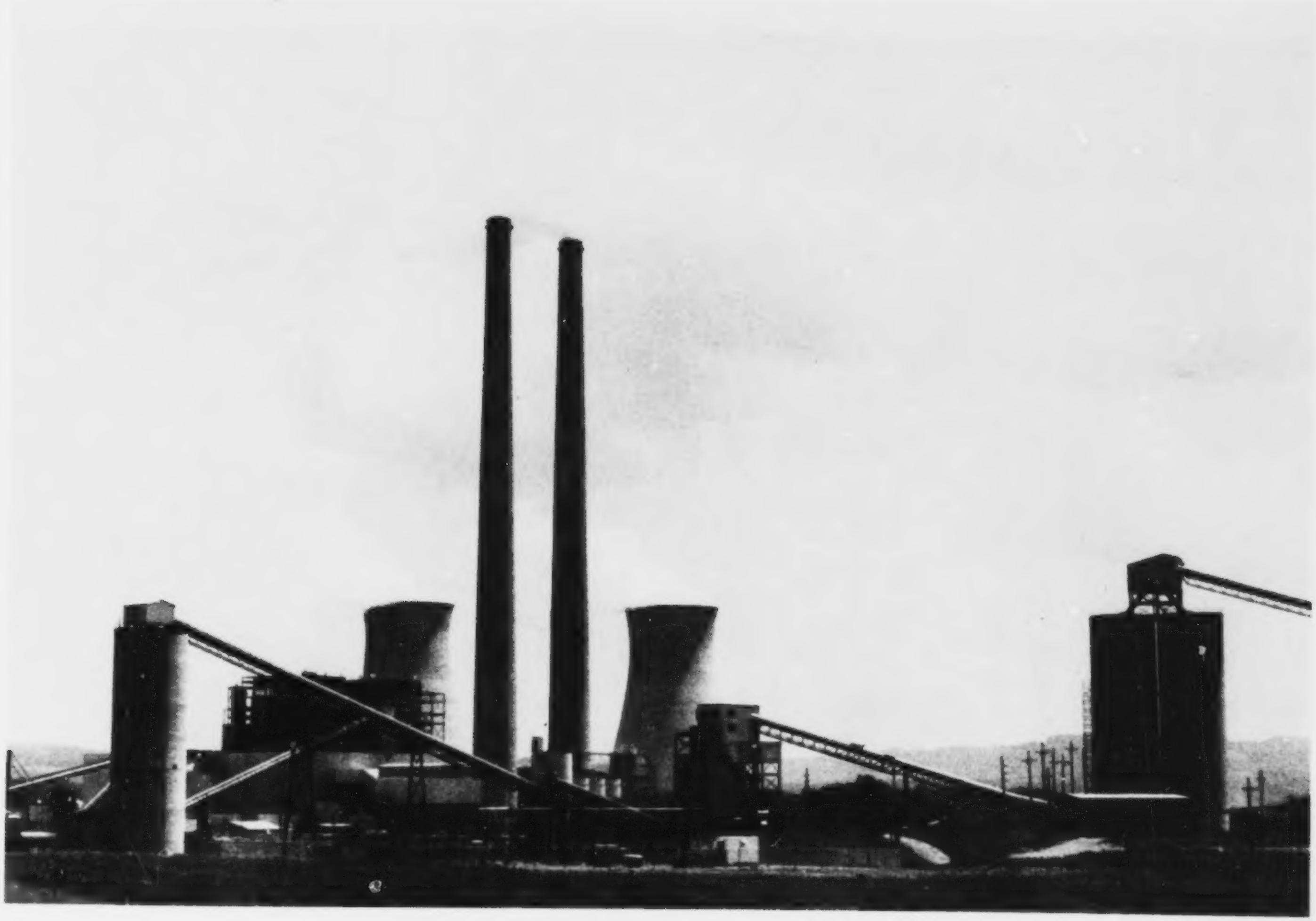


Figure 3. Homer City Generating Station.

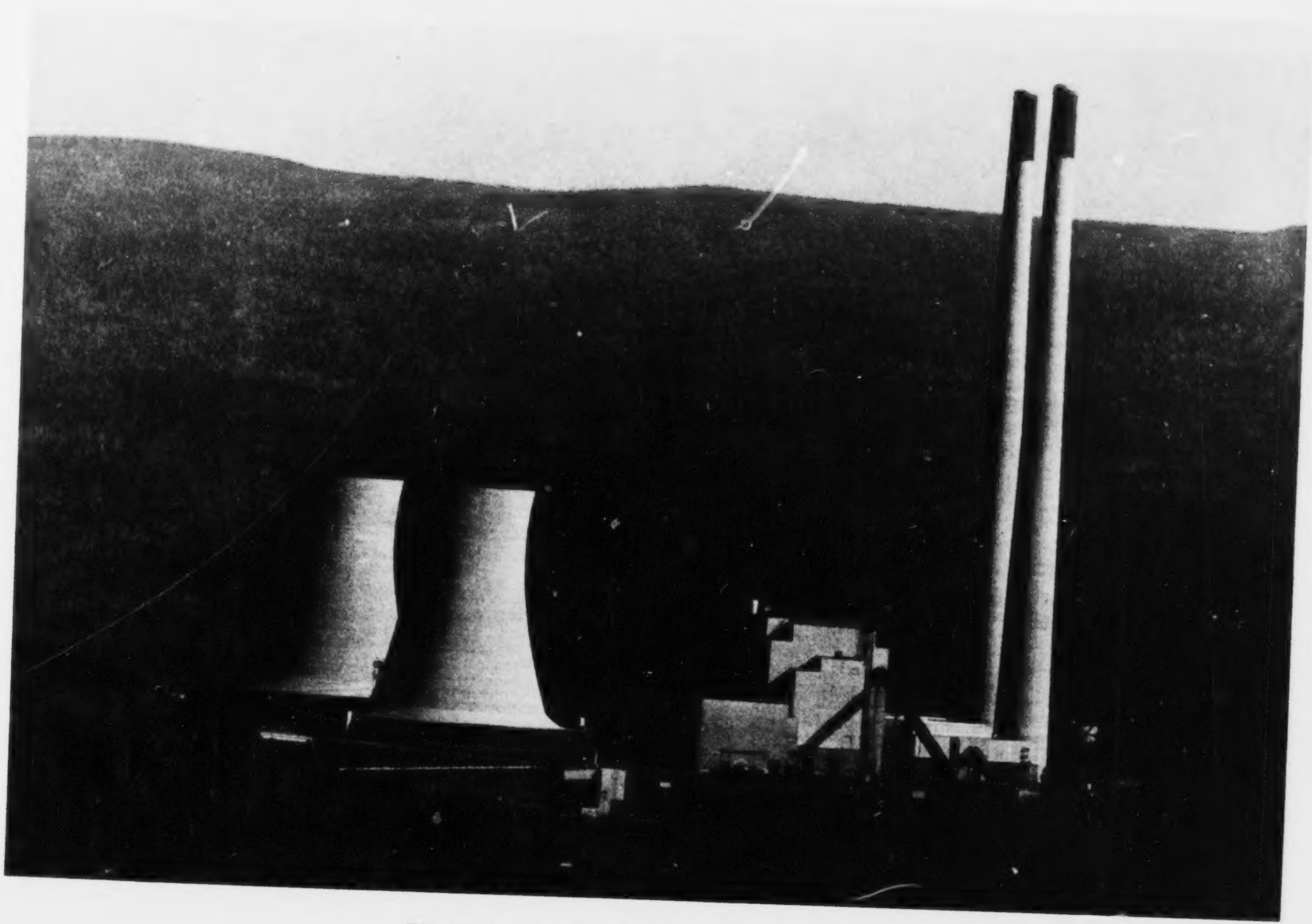


Figure 4. Conemaugh Generating Station.

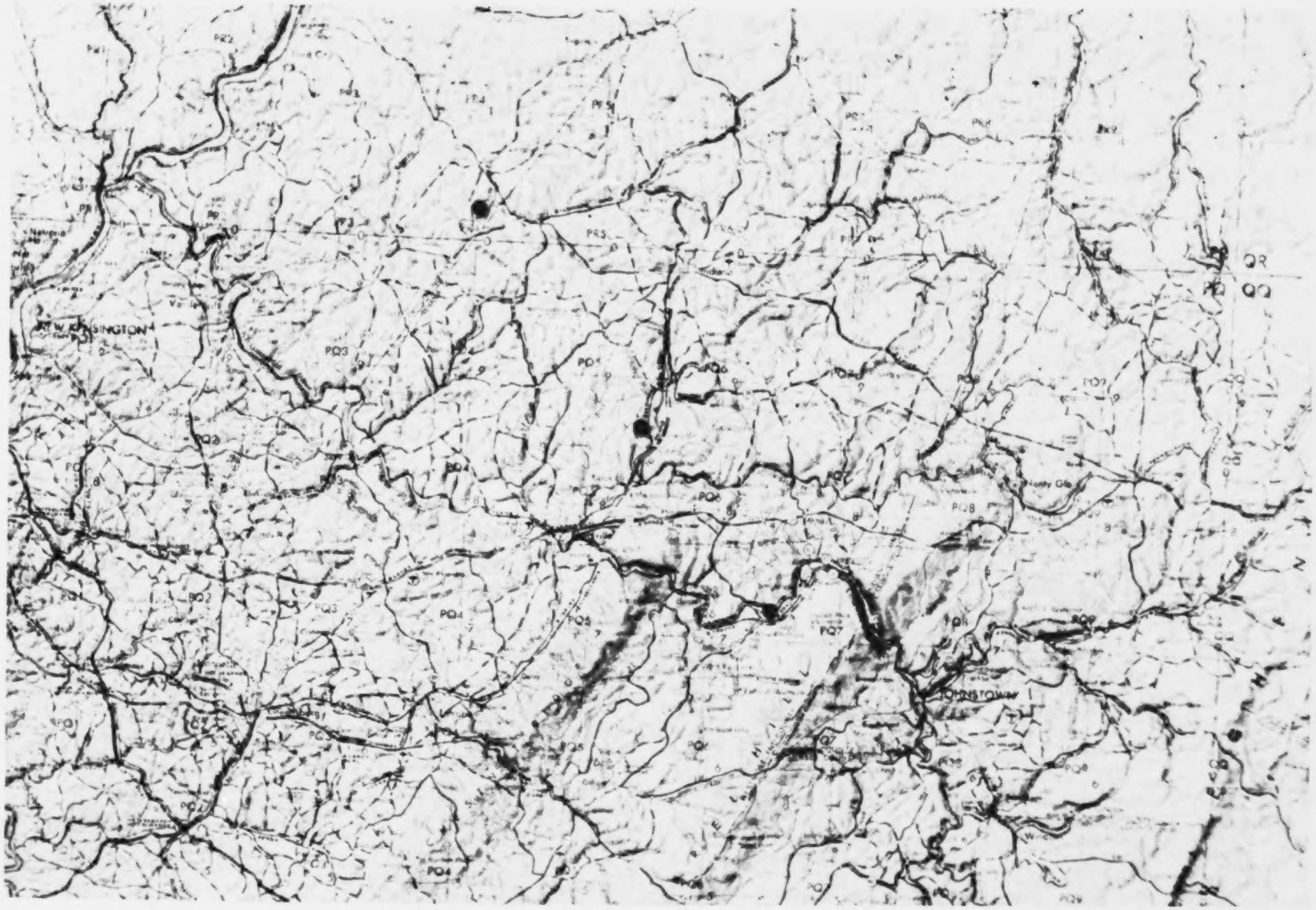

NEW KENSINGTON
JOHNSTOWN
QR
QQ
PR
PQ

Figure 5. Topography of generating station complex.

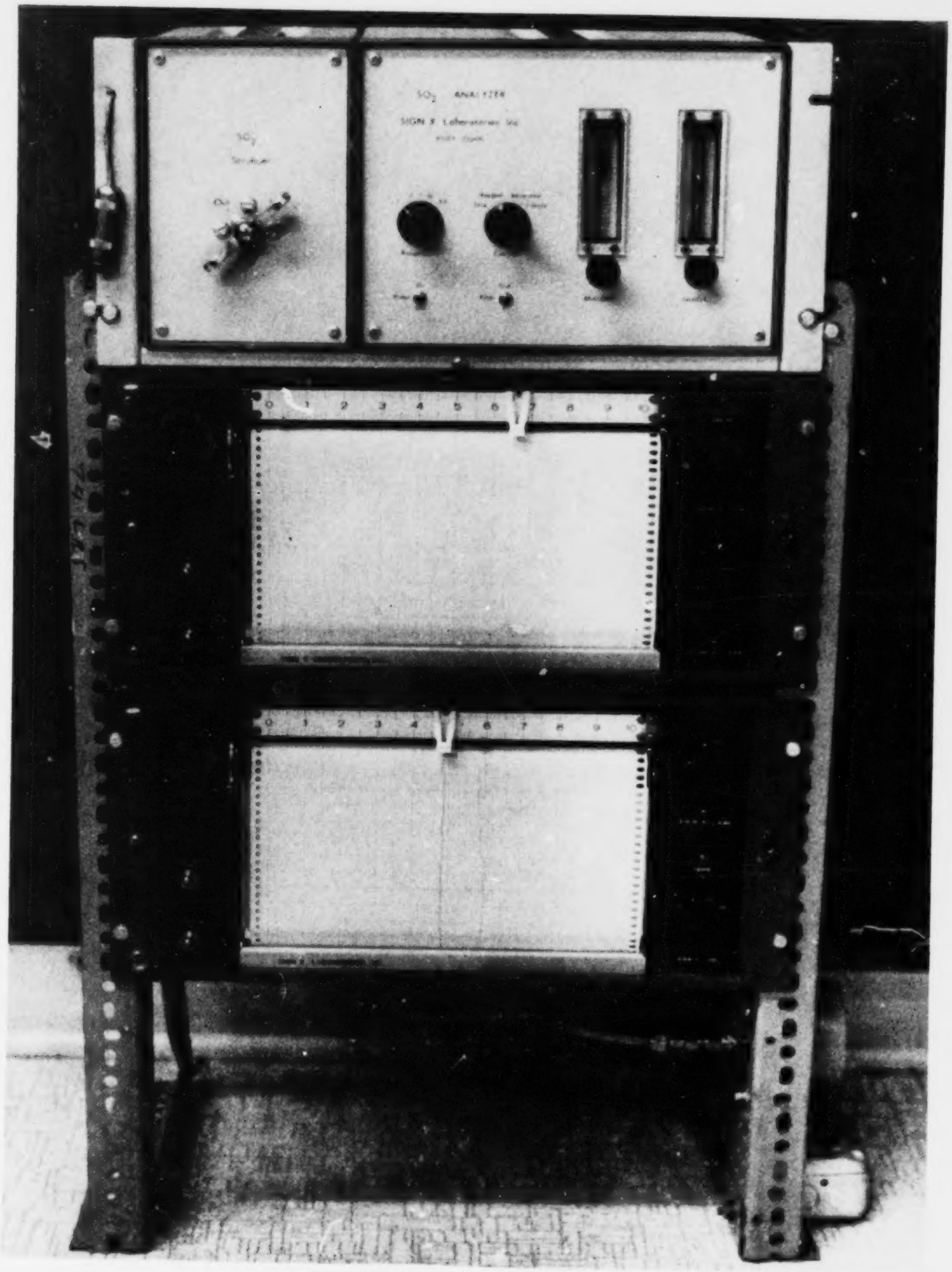

SO2 ANALYZER
0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 9 10

Figure 6. Helicopter instrument package.

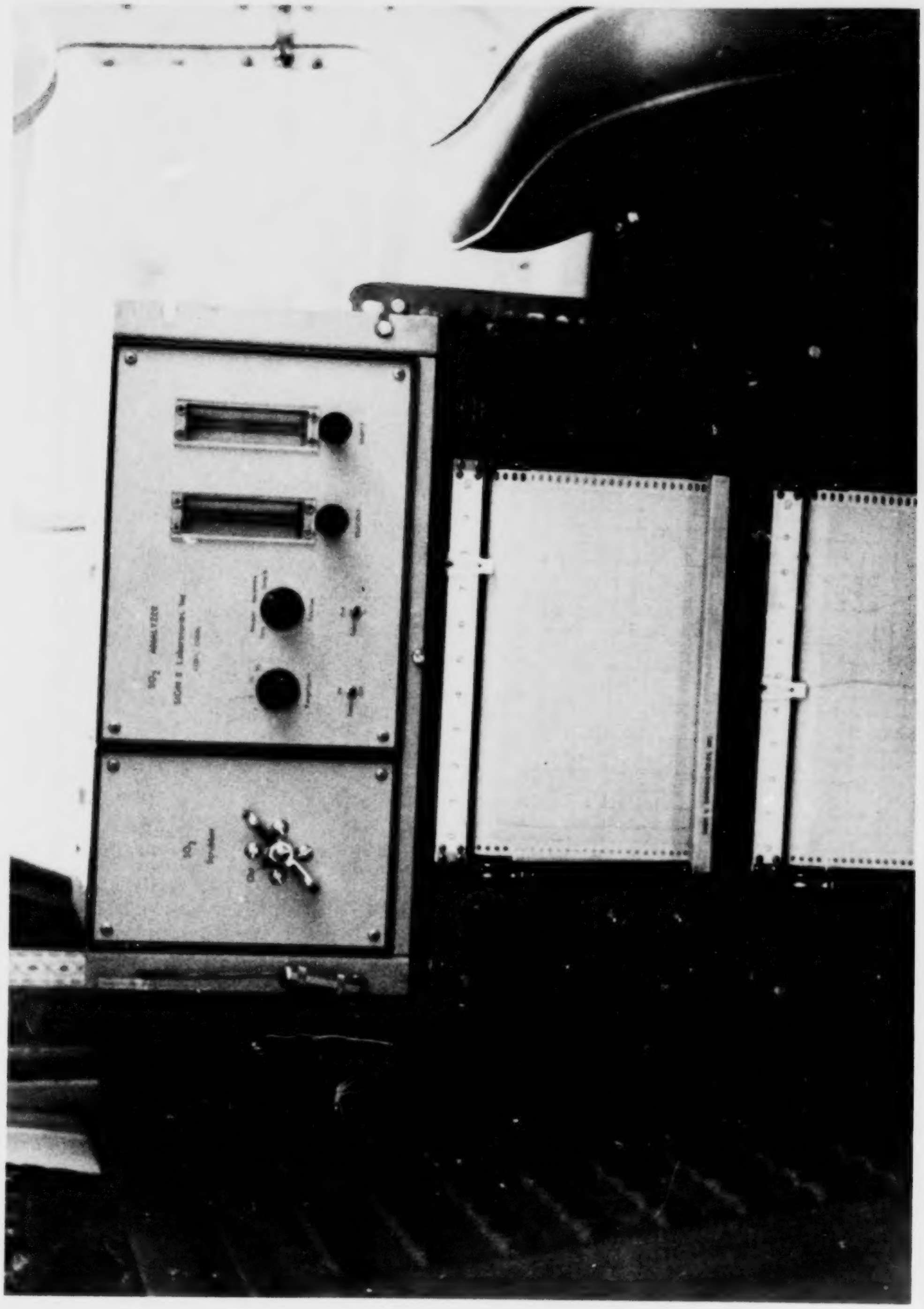


Figure 7. Interior of instrumented helicopter.

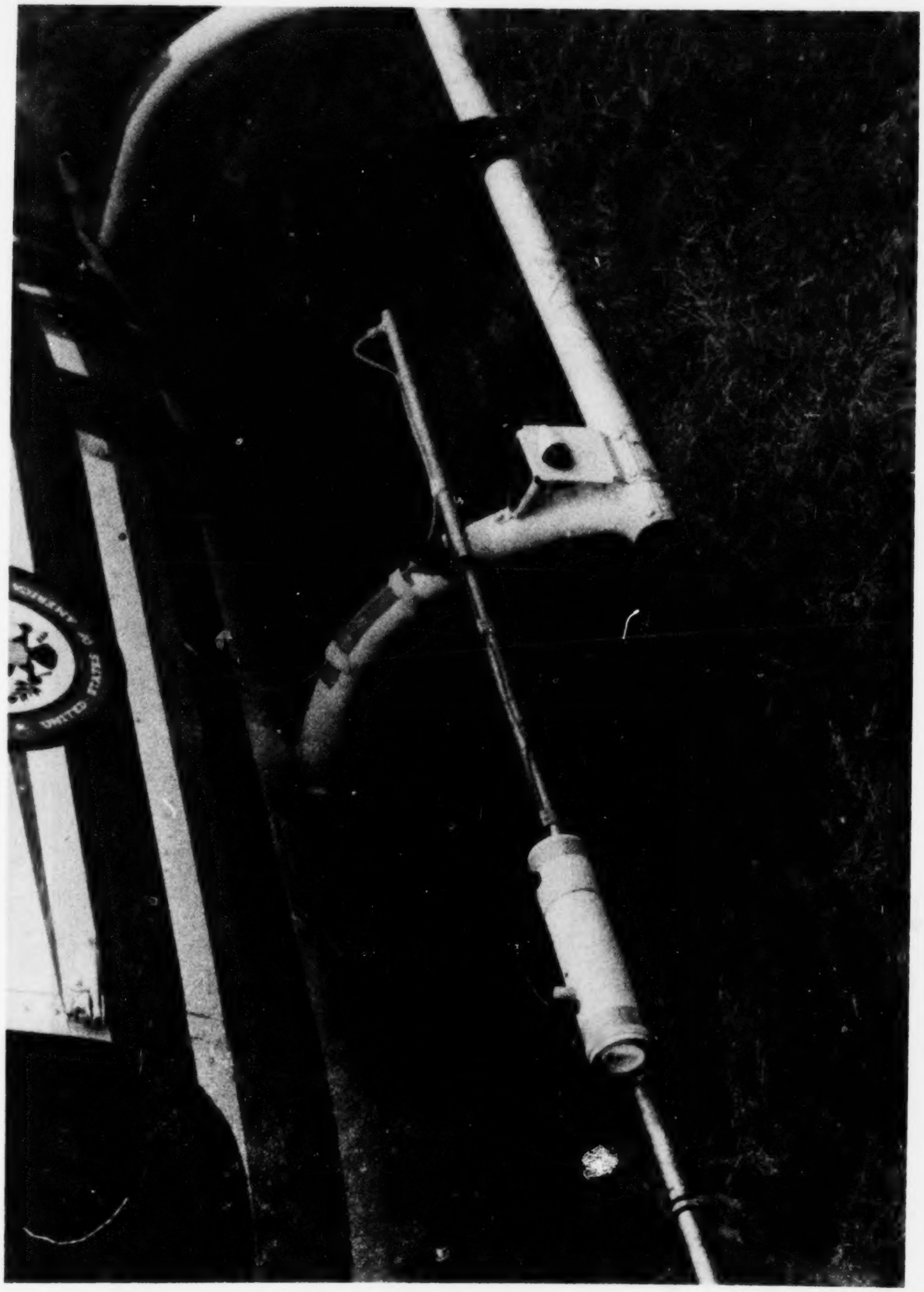

UNITED STATES

Figure 8. External helicopter probe.

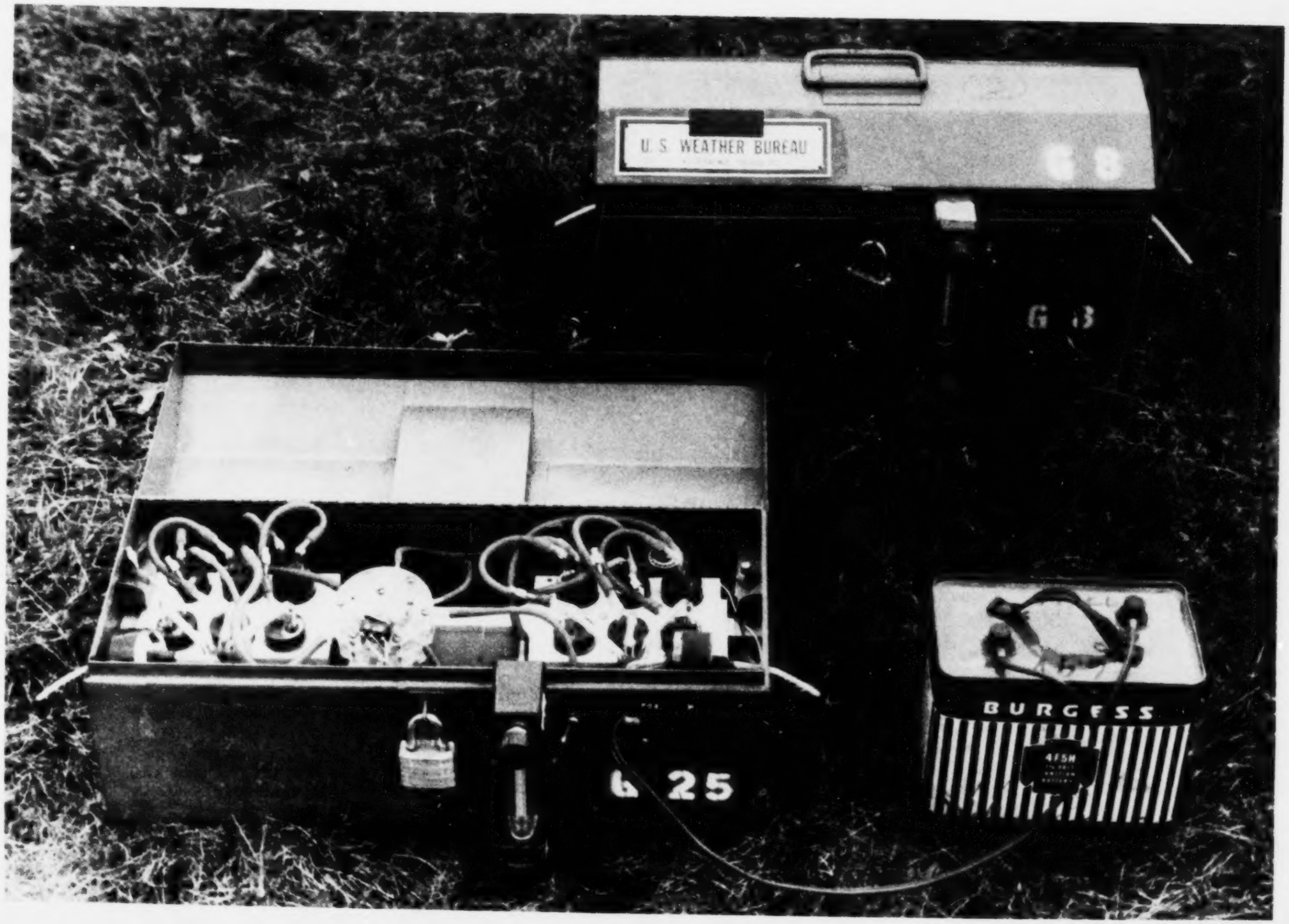

U. S. WEATHER BUREAU
G 8
G 25
BURGESS

Figure 9. Portable SO_2 bubbler.

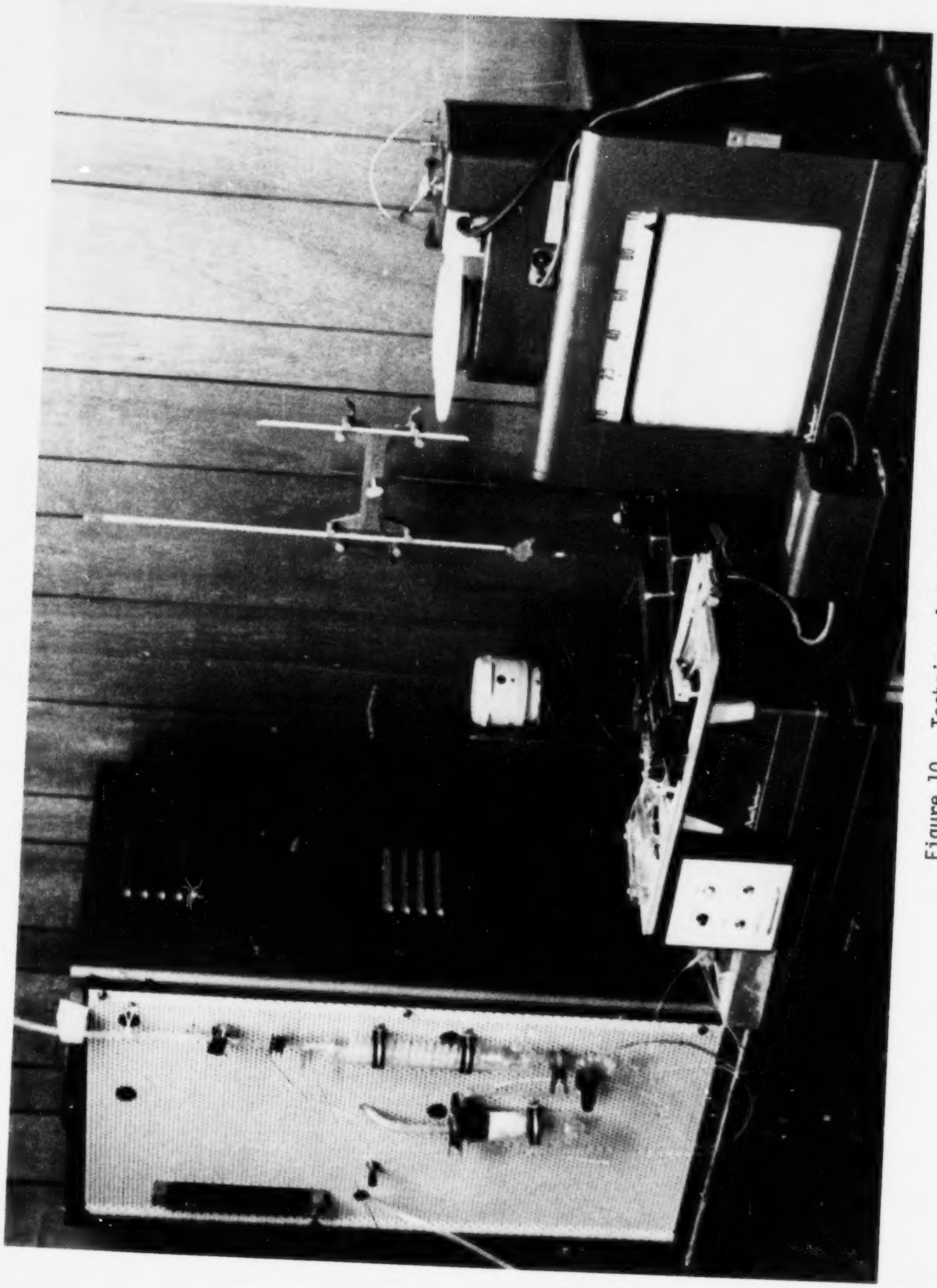


Figure 10. Technicon AutoAnalyzer.

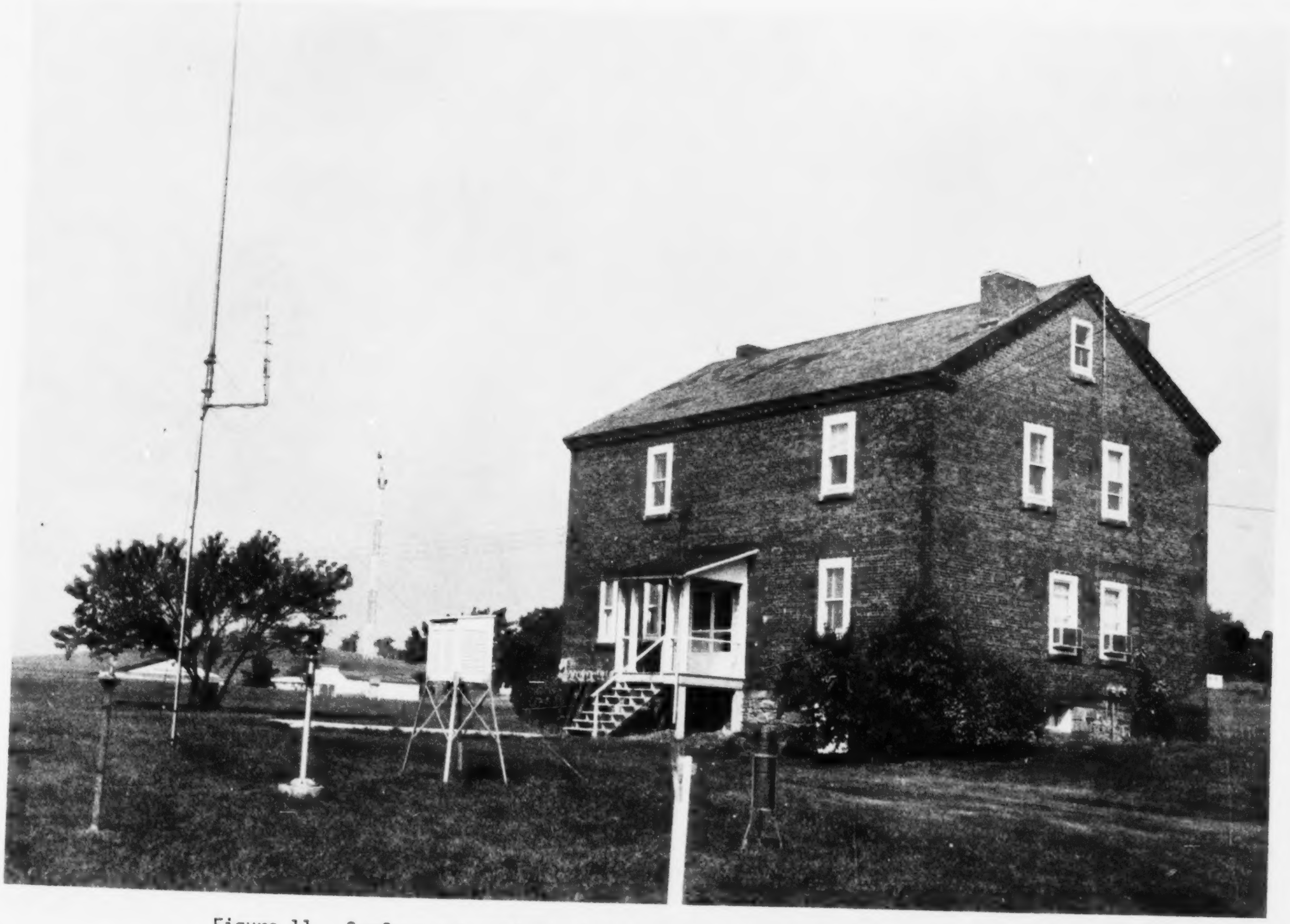


Figure 11. Surface meteorological instrumentation at Jimmy Stewart Airport.

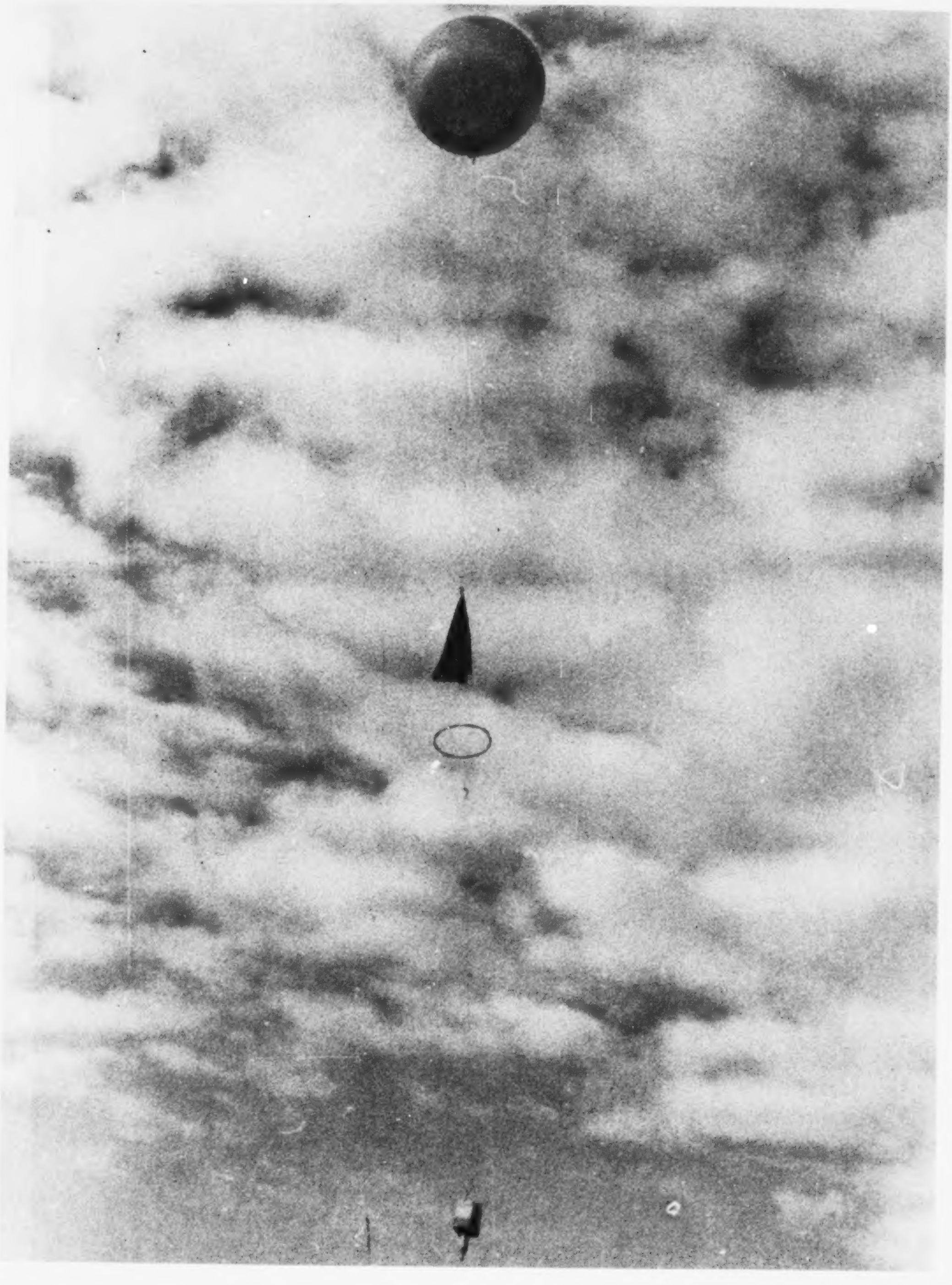


Figure 12. Radiosonde ascent.

PART 2 - DATA TABULATIONS

INTRODUCTION

Part 2 presents in tabulated form the specialized air quality and meteorological measurements as well as the plant operational data collected during two 1971 LAPPES series. Supplementary data that may assist in analyzing plume dispersion are also included. These consist of surface meteorological and SO_2 measurements obtained at Jimmy Stewart Airport and surface and 500-millibar charts for each series day. An introduction to each set of tables describes the data and format and gives other pertinent information.

The specialized air quality and meteorological measurements and plant operational data contained in Part 2 of this volume were collected during the following periods:

April 1971 LAPPES Series : 21 April - 20 May 1971
October 1971 LAPPES Series : 18 October - 17 November 1971

Supplementary data are included in Tables 1 and 2 for the above two LAPPES series as well as for specific days during the following contractor experiment periods:

Brookhaven Plume Tracking : 19 - 24 May 1971
Brookhaven Plume Tracking : 8 - 15 October 1971
Brookhaven Plume Tracking : 3 - 5 November 1971

All data are presented in metric units because the adoption of a single consistent set of units allows more direct utilization of the data. This required conversion of the following measurements: Aerovane wind speed, surface temperature and precipitation, and all plant operational data. In performing these conversions, care was exercised that neither a sacrifice nor an implied gain of accuracy was effected.

Both polar and rectangular coordinate systems are utilized in this data summary. With the Conemaugh or Keystone stacks as origin, the polar coordinates locate specific points such as cross section reference points and bubbler sites. On the other hand, right-hand rectangular coordinates are primarily used to indicate directions and have no fixed origin. The rectangular system is oriented so that plus x points downwind, and plus y indicates a counterclockwise direction around the source.

Actual terrain elevations under plume cross sections (Table 3) and ground-level helicopter flights (Tables 4 and 5) may be obtained by referring to topographic maps published by the U.S. Geological Survey (USGS, 1971).

DAILY EXPERIMENT SUMMARY

An experiment summary page is presented in Table 1 for each day during 1971 on which flights were made by the LAPPES helicopter or on which data were collected by Brookhaven National Laboratory. Although hourly, plant-operational data are listed in Table 12, the headings in the experiment summary identify the generating station being sampled and designate the units in operation.

The summary sheets also enumerate the types of air quality and meteorological measurements collected each day by LAPPES personnel. Although data from Brookhaven's activities are not included in this volume, their participation is noted on specific days. Also included is a commentary in which deviations from normal experiment procedures are explained and items of relevant information are presented. During both 1971 series, the Conemaugh plume occasionally traversed Chestnut Ridge or Laurel Ridge; this fact is mentioned in the commentary on appropriate days to alert the reader that surface elevations under the plume were considerably higher than stack base elevation.

The final section of each daily experiment summary consists of a brief description of the existing synoptic situation and the 0700 EST surface and 500-millibar charts from the Daily Weather Map (NOAA, 1971). The plume wind included in the synoptic description is intended only to furnish a general indication of plume direction and speed; complete wind profiles are presented in Tables 9 and 10 of this volume.

Table 1. DAILY EXPERIMENT SUMMARY

Legend

GLC : Ground-level SO_2 concentration.

Regional : Description of Daily Weather Map surface and 500-mb features over eastern half U.S., and surface and 500-mb winds at Pittsburgh.

Local : Meteorological conditions in vicinity of source generating station at beginning and end of daily sampling periods. Because of topographical influences near the Conemaugh Station, these local observations do not necessarily reflect conditions downwind.

Low clouds : Cloud base lower than 2000 meters above stack base elevation.

Middle clouds : Cloud base between 2000 and 6000 meters above stack base elevation.

High clouds : Cloud base higher than 6000 meters above stack base elevation.

Plume wind : Pilot balloon wind at 300 meters above stack base elevation at Conemaugh or 250 meters above stack base elevation at Keystone. If pilot balloon not available, plume wind determined from radiosonde and so indicated.

Mps : Meters per second.

Table 1. DAILY EXPERIMENT SUMMARY

April 1971 Series 21 April 1971 Conemaugh Plume Units 1 and 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

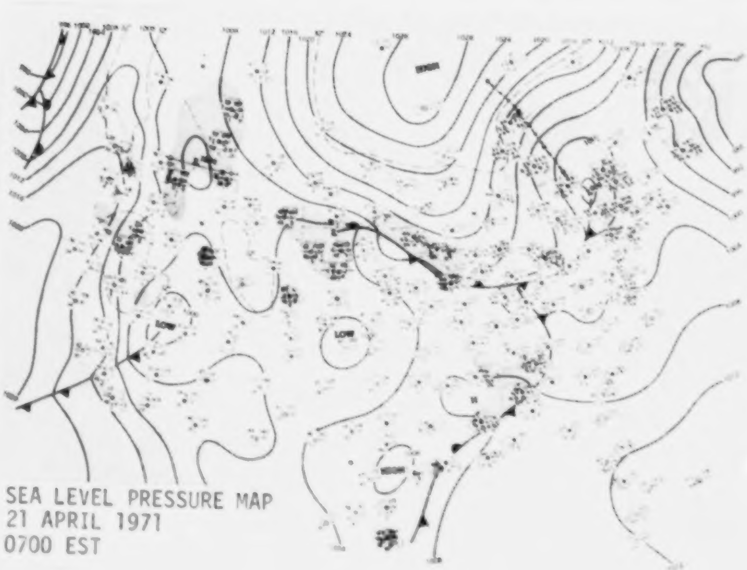
High SO_2 background aloft and at surface. Very wide plume. Three cross sections attempted; 16 km cross section incomplete because of low fuel supply. 10 km cross section, flown during light rain showers, reflects shifting wind direction; bottom was at the surface. Good coverage of neutral GLC by helicopter and bubblers out to 25 km. No afternoon flight attempted because of low-level turbulence and intermittent rain showers. AutoAnalyzer at airport office measured high background GLC during morning and early afternoon. Plume heading across Laurel Ridge.

Synoptic Situation

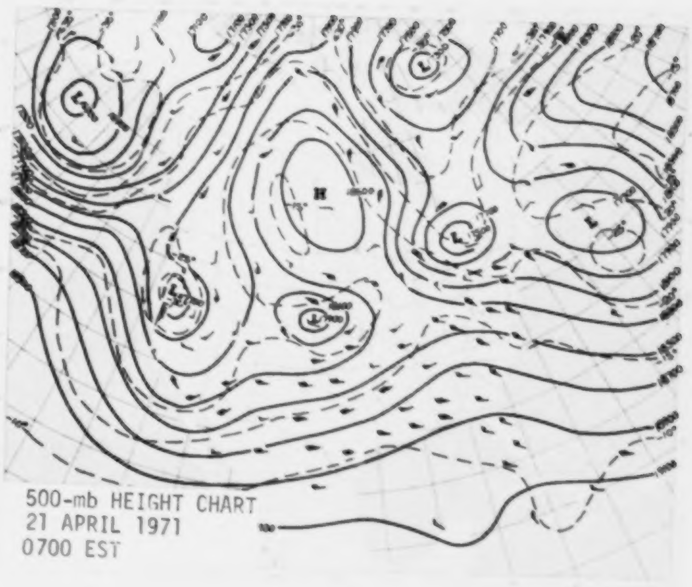
Regional - Closed low over eastern Lake Ontario with cold front southwestward through Pittsburgh to secondary low over Indiana-Ohio border; weak trough along middle Atlantic coast. Surface wind NW 5 mps. Closed 500-mb low over southern Ontario-Quebec border with trough extending into Wisconsin; near-zonal flow over southeastern U.S. Wind at 500 mb NW 23 mps.

Local - Sunrise low overcast; light rain showers at 8 and 10 AM. Stable with inversions to 710 meters; lapse above to 1090 meters. Plume wind W 6 mps. 1 PM low overcast with light rain showers. Neutral to 865 meters; stable above to 1085 meters. Plume wind SW 4 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
21 APRIL 1971
0700 EST



500-mb HEIGHT CHART
21 APRIL 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 22 April 1971 Conemaugh Plume Units 1 and 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
On-stream AutoAnalyzer GLC
Helicopter Instantaneous GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

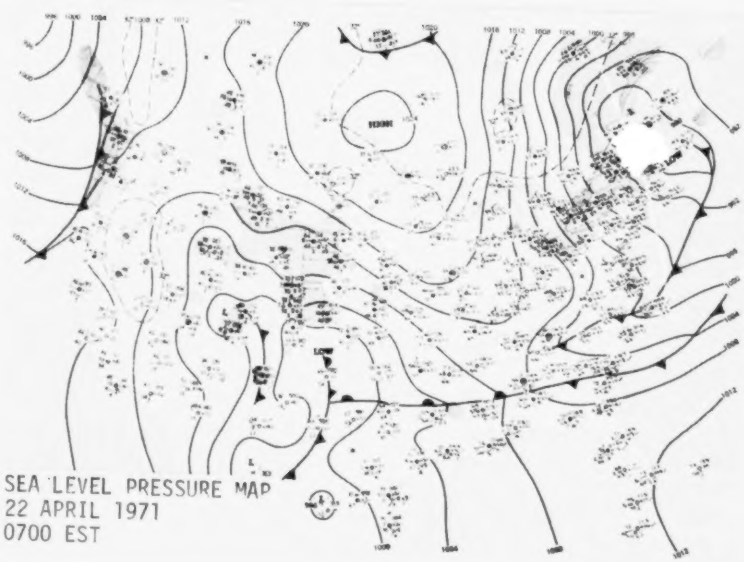
Only 4 and 10 km cross sections attempted. Tops of both incomplete because of low clouds; bottoms were at the surface. High wind, neutral GLC measured by helicopter on both sides of Laurel Ridge but not on top because of low clouds. Ground-level flights discontinued and bubblers were not set out because of rain showers. Low-altitude termination of temperature profiles and pilot balloons caused by low clouds. Plume heading across Laurel Ridge.

Synoptic Situation

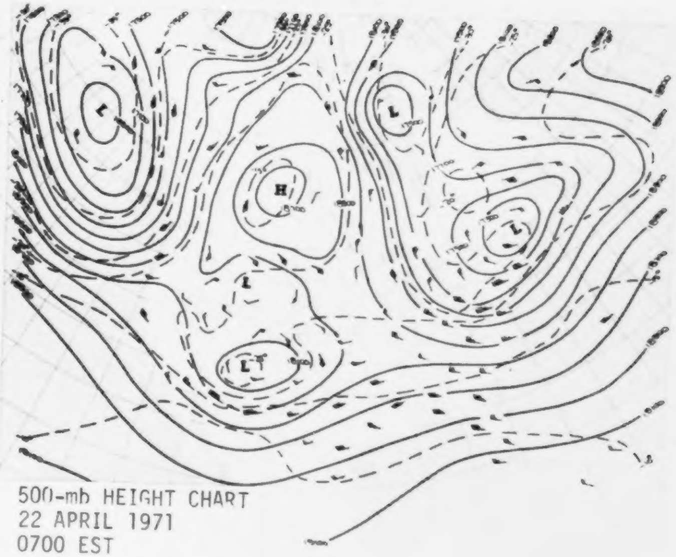
Regional - Elongated closed low centered over eastern Maine with cold front southwestward from Nova Scotia through North Carolina; closed high over Manitoba with ridge southeastward to Kentucky. Surface wind NW 5 mps. Closed 500-mb low over Maine with trough southwestward through Pennsylvania. Wind at 500 mb NW 23 mps.

Local - Sunrise low overcast; light rain showers beginning at 8 AM. Slight inversion 350-400 meters; neutral below and lapse above to 515 meters. Plume wind W 8 mps. 9 AM low overcast with light rain showers. Slight inversion 400-450 meters; neutral below and above to 510 meters. Plume wind WNW 8 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
22 APRIL 1971
0700 EST



500-mb HEIGHT CHART
22 APRIL 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 23 April 1971 Conemaugh Plume Units 1 and 2

SO_2 Measurements

Plume Cross Section
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

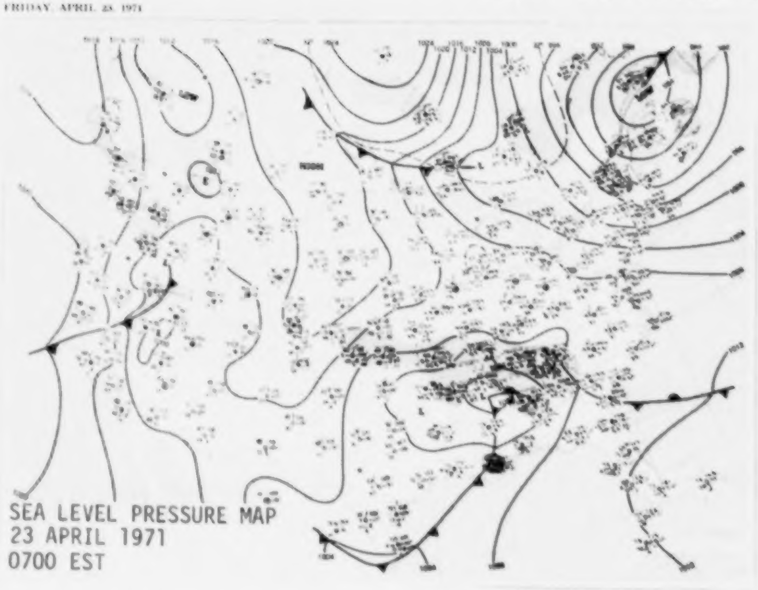
High SO_2 background aloft. One 4 km cross section completed; no 10 or 16 km cross sections attempted to conserve flight time for GLC measurements. Good coverage of inversion breakup GLC and subsequent looping plume GLC by helicopter out to 22 km; partial coverage by bubblers. No afternoon flight attempted because of strong low-level turbulence. AutoAnalyzer at airport office measured GLC from Keystone plume during inversion breakup. Plume heading across Laurel Ridge.

Synoptic Situation

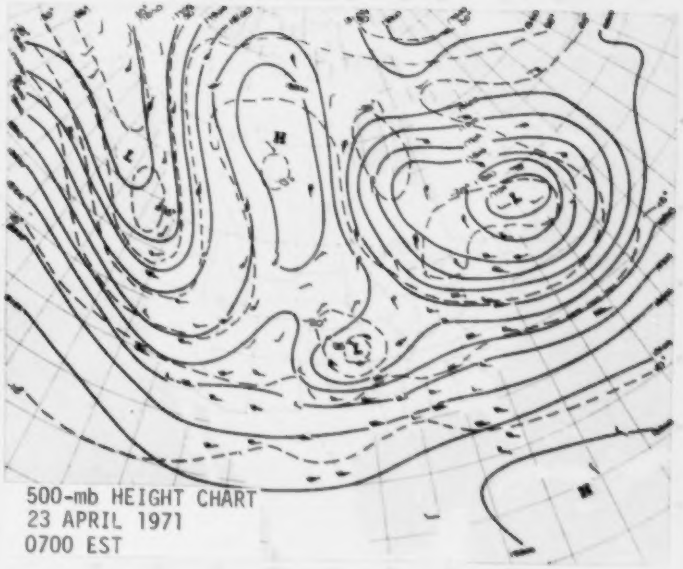
Regional - Closed low over mouth of St. Lawrence River and over northern Mississippi; weak ridge from Dakotas through North Carolina coast. Surface wind calm. Northeastern U.S. under influence of deep 500-mb low centered over New Brunswick; zonal flow over southeastern U.S. Wind at 500 mb NW 35 mps.

Local - Sunrise clear; haze and smoke 8-11 AM. Stable with inversions to 450 meters; lapse above to 1100 meters. Plume wind WSW 3 mps. Noon clear. Neutral to 1120 meters. Plume wind W 11 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


FRIDAY, APRIL 23, 1971

SEA LEVEL PRESSURE MAP
23 APRIL 1971
0700 EST



500-mb HEIGHT CHART
23 APRIL 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 24 April 1971 Conemaugh Plume Units 1 and 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosonde
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

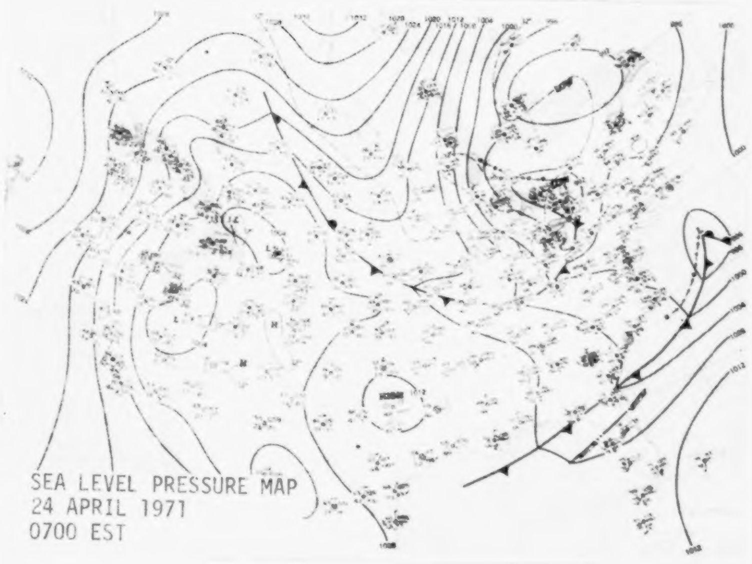
High SO_2 background at surface. Only 4 and 10 km cross sections completed; no 16 km cross section attempted to conserve flight time for GLC measurements. Partial coverage of high wind, neutral GLC by helicopter out to 22 km. Ground-level flights discontinued and bubblers picked up early because of strong low-level turbulence and rain and snow showers. AutoAnalyzer at airport office measured high background GLC during early morning. Afternoon radiosonde not released.

Synoptic Situation

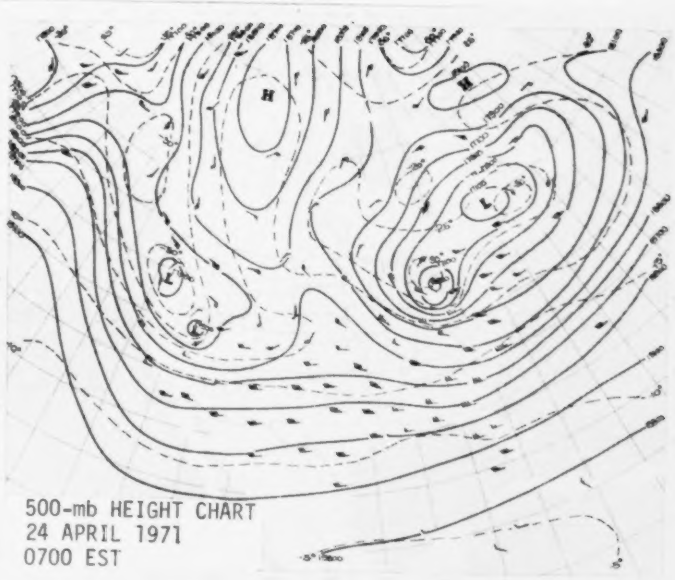
Regional - Closed low over Lakes Huron and Ontario with cold front through Pittsburgh and St. Louis; secondary low off central Atlantic coast. Surface wind WSW 8 mps. Closed 500-mb lows over Lake Huron and eastern Quebec; near-zonal flow over eastern fourth U.S. Wind at 500 mb W 35 mps.

Local - Sunrise low overcast. Surface inversion to 380 meters; lapse above to 1065 meters. Plume wind SW 13 mps. 10 AM low overcast with light rain and snow showers. Near-neutral to 565 meters. Plume wind WSW 12 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
24 APRIL 1971
0700 EST



500-mb HEIGHT CHART
24 APRIL 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 26 April 1971 Conemaugh Plume Units 1 and 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC

Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helecopter Temperature Profiles

Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

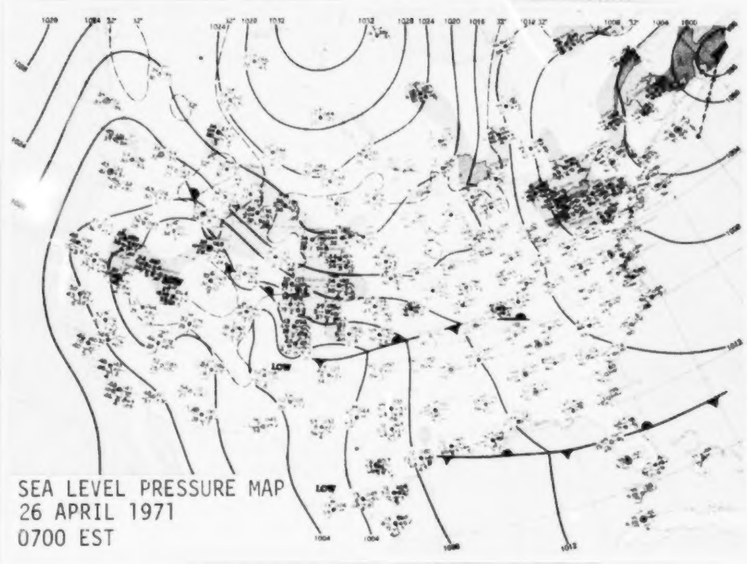
Very wide plume. Only 4 and 10 km cross sections attempted; bottoms were at the surface. Top of 10 km cross section incomplete because of low clouds. Good coverage of neutral GLC by helicopter and bubblers out to 20 km. Ground-level flights discontinued because of rain and snow showers. Low-altitude termination of some pilot balloons caused by low clouds. Plume heading across Laurel Ridge.

Synoptic Situation

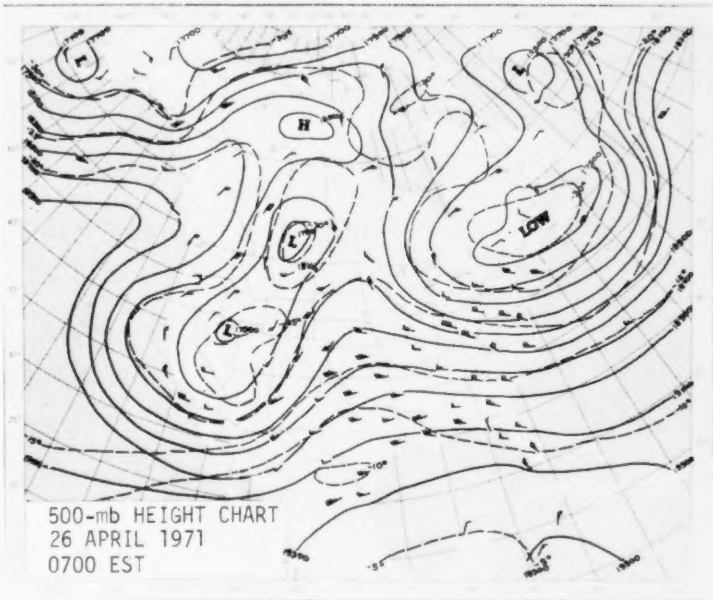
Regional - Weak NE-SW trough through Atlantic coastal states; weak ridge from Wisconsin through Florida. Surface wind W 5 mps. Closed 500-mb low over Maine and southeastern Canada; strong NW-SE flow over eastern third U.S. Wind at 500 mb NW 30 mps.

Local - Sunrise broken to overcast low clouds with fog and haze. Surface inversion to 100 meters; lapse above to 1095 meters. Plume wind W 5 mps. 11 AM low overcast with light rain and snow showers. Near-neutral to 1095 meters. Plume wind W 9 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
26 APRIL 1971
0700 EST



500-mb HEIGHT CHART
26 APRIL 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 28 April 1971 Conemaugh Plume Units 1 and 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC

Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Helicopter Temperature Profiles
Pilot Balloons

Airport Surface Data

Other Participants

None

Commentary

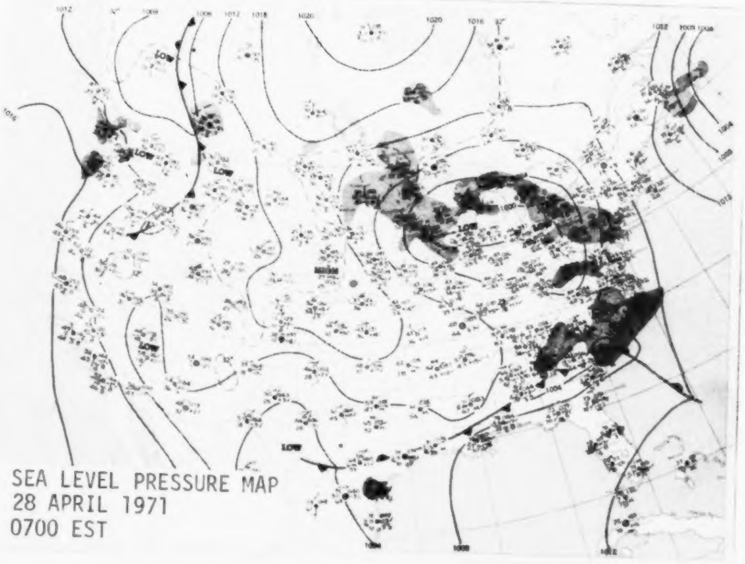
Very wide plume. Only 4 and 10 km cross sections attempted; bottoms were at the surface. Top of 4 km cross section incomplete because of steam plume interference; 10 km cross section flown during light rain showers. Few GLC measured by helicopter before increased rainfall and restricted visibility forced termination of flights. Zero GLC measured by bubblers because Laurel Ridge lee wave did not develop. Low-altitude termination of pilot balloons and one temperature profile caused by low clouds; no radiosondes released.

Synoptic Situation

Regional - Large closed low over northeastern U.S.; secondary low from Alabama through South Carolina. Surface wind light southeasterly. 500-mb ridge along central Atlantic coast through Quebec; strong zonal flow over southeastern U.S. Wind at 500 mb W 30 mps.

Local - Sunrise low overcast with light rain showers. Stable with inversions to 1000 meters. Plume wind S 7 mps. 8 AM low overcast with light rain showers and fog. Stable with inversions to 570 meters. Plume wind SSW 3 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


SEA LEVEL PRESSURE MAP
28 APRIL 1971
0700 EST

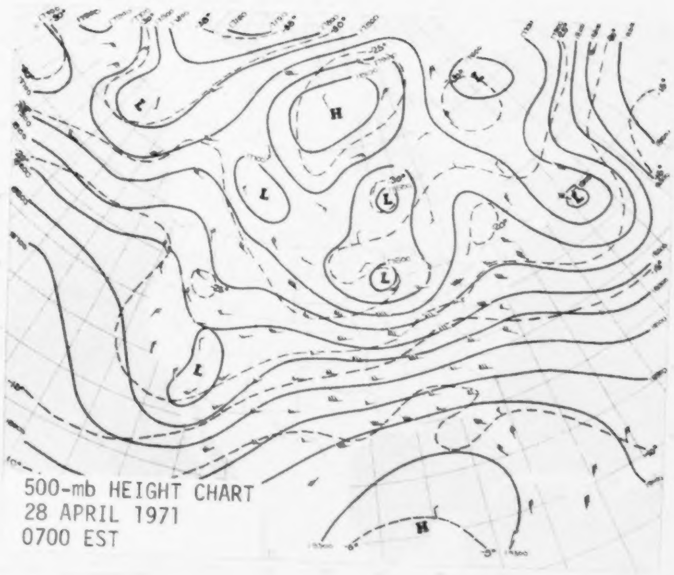

500-mb HEIGHT CHART
28 APRIL 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 29 April 1971 Conemaugh Plume Units 1 and 2

SO_2 Measurements

Plume Cross Section
Helicopter Peak GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meterological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

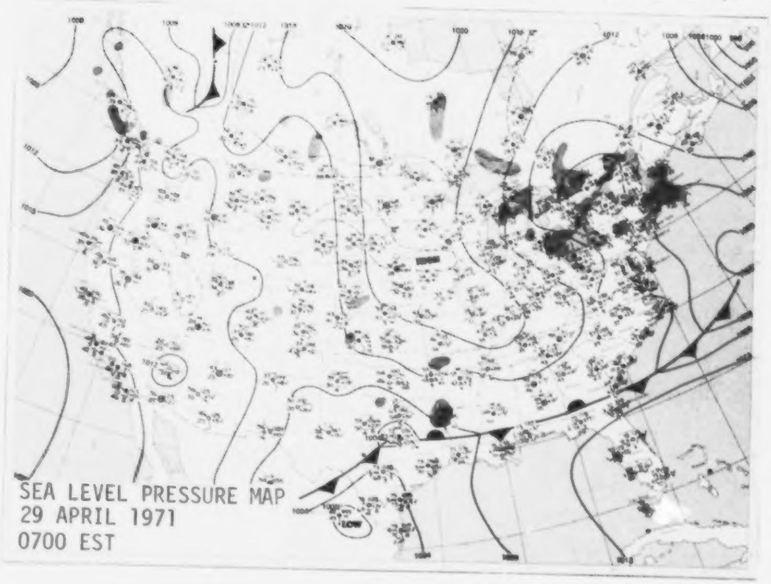
One 4 km cross section attempted but top incomplete because of low clouds; bottom was at the surface. Partial coverage of high wind, neutral GLC by helicopter out to 25 km; good coverage by bubblers. Ground-level flights discontinued because of strong low-level turbulence and rain showers. Low-altitude termination of temperature profiles and pilot balloons caused by low clouds. Plume heading across Laurel Ridge.

Synoptic Situation

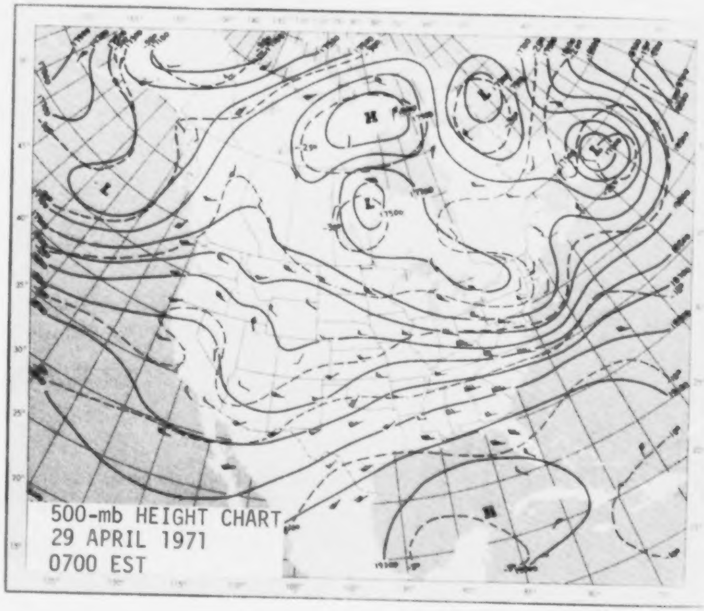
Regional - Closed low over Ontario-New York border with trough southeastward; weak high over central and southeastern U.S. Surface wind W 5 mps. Closed 500-mb low over northern Manitoba with trough southeastward through Connecticut coast; near-zonal flow over southeastern U.S. Wind at 500 mb NW 35 mps.

Local - Sunrise low overcast with fog and haze. Near-neutral to 840 meters. Plume wind W 13 mps. 9 AM low overcast with light rain showers and fog. Near-neutral to 800 meters. Plume wind W 10 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
29 APRIL 1971
0700 EST



500-mb HEIGHT CHART
29 APRIL 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 4 May 1971 Conemaugh Plume Unit 1

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC

Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles

Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

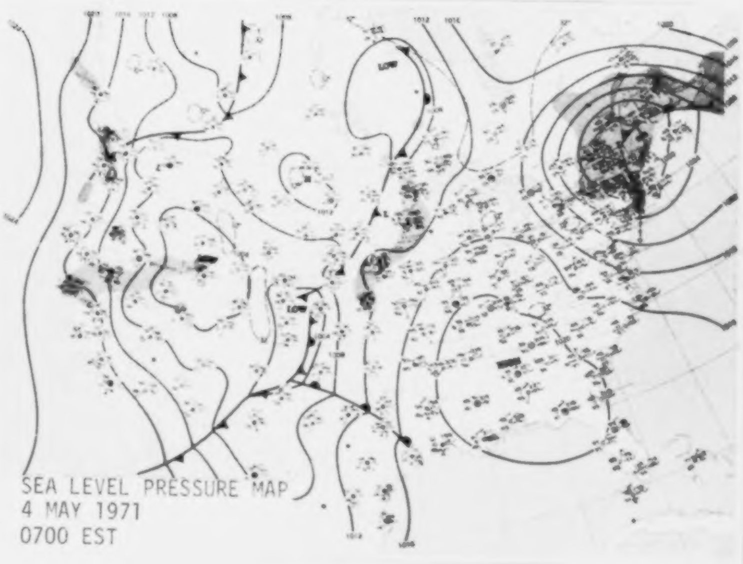
High SO_2 background aloft. Only 4 and 10 km cross sections attempted. Tops of both incomplete because of high SO_2 background; bottoms were at the surface. Good coverage of limited mixing layer GLC and looping plume GLC by helicopter out to 25 km; partial coverage by bubblers. No afternoon flight attempted because of strong low-level turbulence. AutoAnalyzer at airport office measured GLC from Keystone plume during inversion breakup. Low-altitude termination of first 5 pilot balloons caused by steam plume interference. Plume heading across Laurel Ridge.

Synoptic Situation

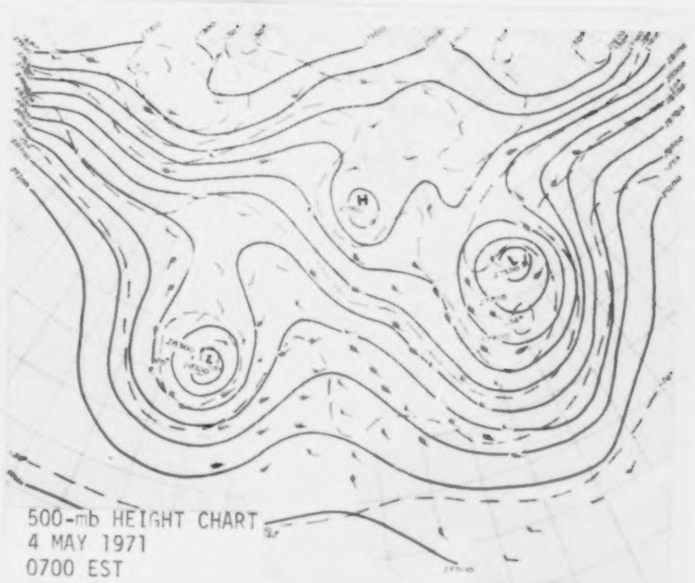
Regional - Closed low over New England states; large high centered over Alabama dominating southeastern U.S. Surface wind NW 5 mps. Closed 500-mb low over New Hampshire with trough southward along Atlantic coast; weak ridge from Missouri through Lake Huron. Wind at 500 mb NNW 20 mps.

Local - Sunrise clear. Inversion 650-800 meters; lapse below and above to 1110 meters. Plume wind W 9 mps. 11 AM scattered low clouds. Neutral to 1100 meters. Plume wind WNW 12 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
4 MAY 1971
0700 EST



500-mb HEIGHT CHART
4 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 5 May 1971 Conemaugh Plume Unit 1

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

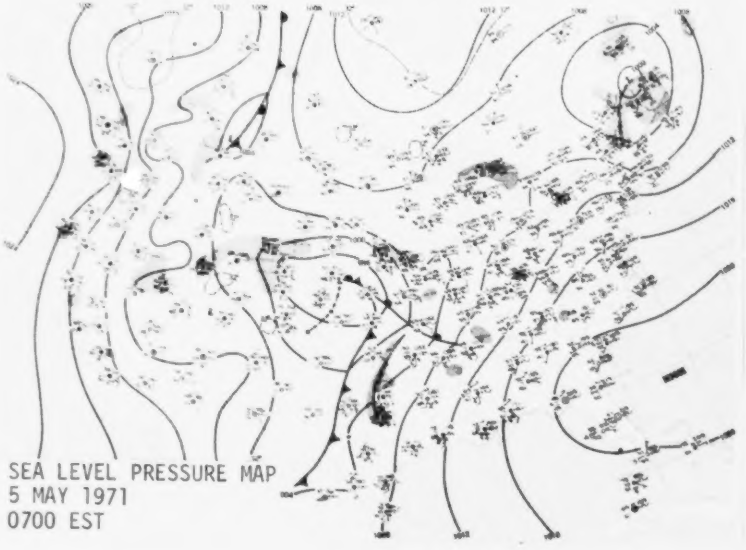
Very wide plume. Only 4 and 10 km cross sections attempted; 10 km cross section not completed because of interference by Seward plume and to conserve flight time for GLC measurements. Good coverage of inversion breakup GLC and looping plume GLC by helicopter out to 22 km. Ground-level flights discontinued because of strong low-level turbulence. Bubblers measured mostly zero GLC at distant locations from Conemaugh. AutoAnalyzer at airport office measured GLC from Homer City plume during inversion breakup.

Synoptic Situation

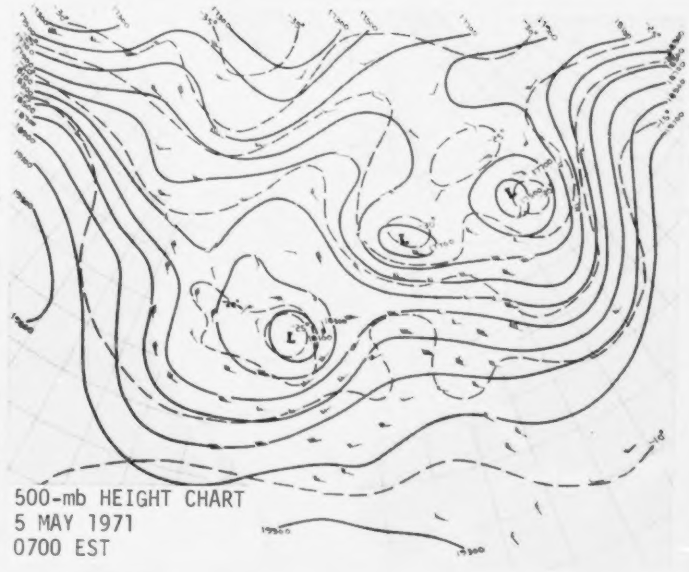
Regional - Closed low over New Brunswick with trough southwestward to low in Nebraska; high over southeastern U.S. Surface wind SW 5 mps. Closed 500-mb low over Lake Superior; northwesterly flow over eastern U.S. Wind at 500 mb WNW 25 mps.

Local - Sunrise broken to overcast low clouds. Stable with inversions to 750 meters; near-neutral above to 1110 meters. Plume wind SW 10 mps. 10 AM scattered low clouds. Near-neutral to 1090 meters. Plume wind W 7 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
5 MAY 1971
0700 EST



500-mb HEIGHT CHART
5 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 7 May 1971 Conemaugh Plume Unit 1

SO_2 Measurements

Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosonde
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

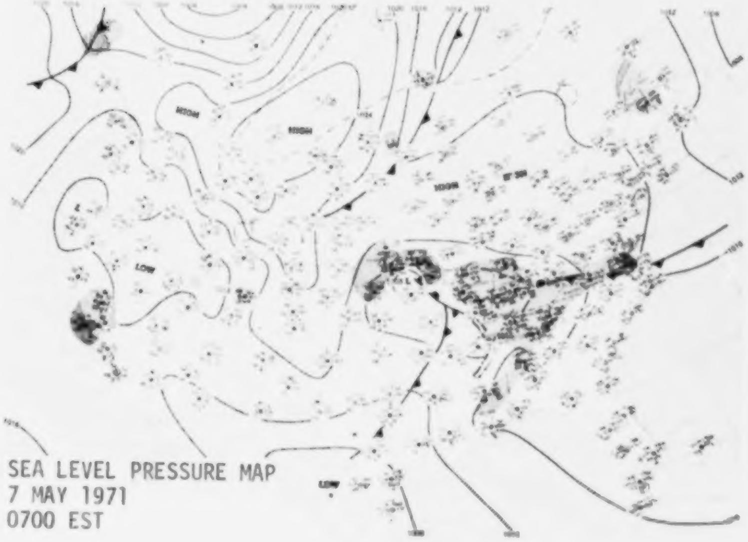
No cross sections attempted because of restricted visibility at plume level. High GLC measured by helicopter in lee of distant ridge (12 km downwind) during early morning stable period. Partial coverage of inversion breakup GLC and looping plume GLC by helicopter out to 24 km. Bubblers measured mostly zero GLC because of plume shift. Release of pilot balloons delayed by fog; no afternoon radiosonde released. Plume heading across Chestnut Ridge.

Synoptic Situation

Regional - Closed low over northwestern Missouri with stationary front eastward through Virginia; weak ridge over Great Lakes and New England. Surface wind calm. 500-mb ridge from Georgia coast through Michigan to James Bay; weak low over Nebraska and Iowa. Wind at 500 mb WNW 25 mps.

Local - Sunrise clear with fog and haze. Stable with inversions to 700 meters; lapse above to 1100 meters. Plume wind (from radiosonde) NE 6 mps. 11 AM low scattered, high overcast. Near-neutral to 1100 meters. Plume wind SE 4 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY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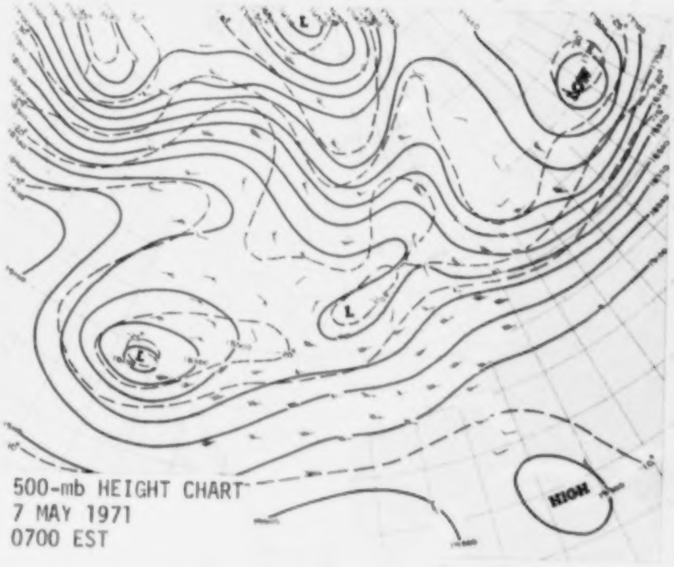
SEA LEVEL PRESSURE MAP
7 MAY 1971
0700 EST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500-mb HEIGHT CHART
7 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 10 May 1971 Conemaugh Plume Unit 1

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

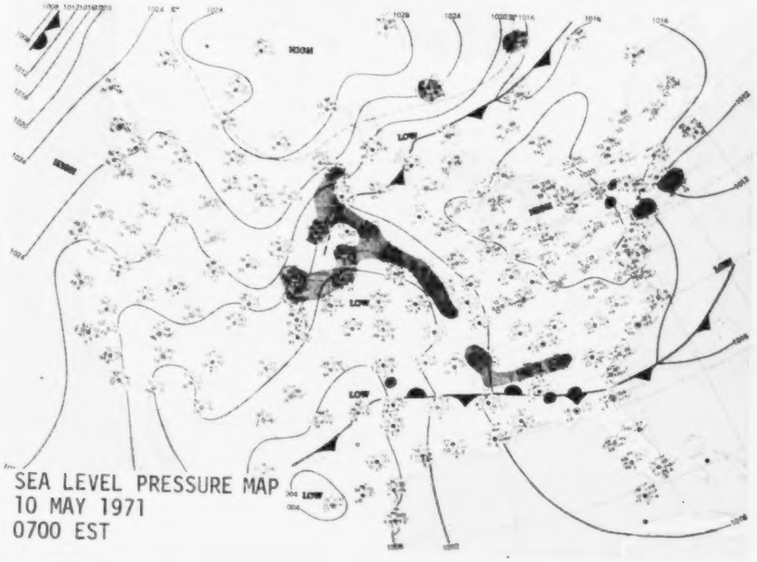
Very wide plume. Only 4 and 10 km cross sections completed; no 16 km cross section attempted to conserve flight time for GLC measurements. Excellent coverage of inversion breakup GLC by helicopter out to 40 km. SO_2 from Seward plume included in GLC measurements within 10 km. Sparse coverage of GLC by bubblers because of placement too far west. Low-altitude termination of last few pilot balloons caused by scattered cumulus.

Synoptic Situation

Regional - Large high dominating eastern third U.S.; E-W frontal trough through Gulf coast states. Surface wind calm. Closed 500-mb low off New England coast; ridge from Alabama through western Great Lakes. Wind at 500 mb N 8 mps.

Local - Sunrise scattered high clouds with ground fog in valleys. Stable with inversions to 650 meters; lapse above to 1120 meters. Plume wind SE 2 mps. 11 AM scattered low clouds. Isothermal layer 450-500 meters; near-neutral below and above to 1135 meters. Plume wind N 3 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY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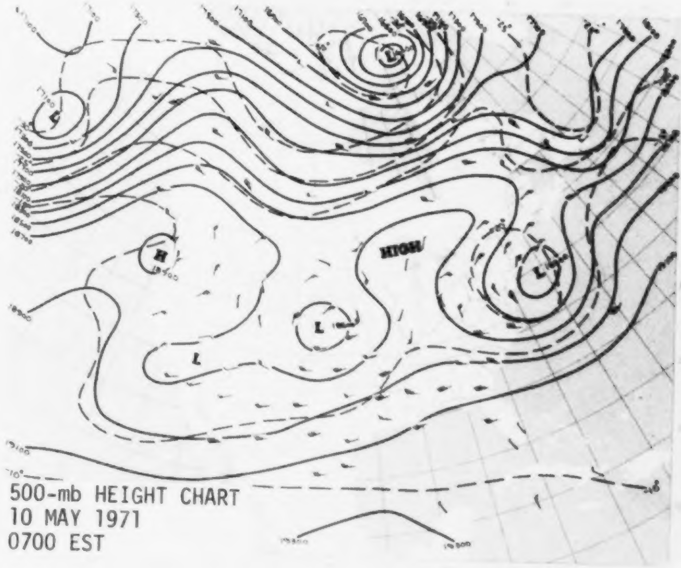
SEA LEVEL PRESSURE MAP
10 MAY 1971
0700 EST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500-mb HEIGHT CHART
10 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 11 May 1971 Conemaugh Plume Unit 1

SO_2 Measurements

Plume Cross Section
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

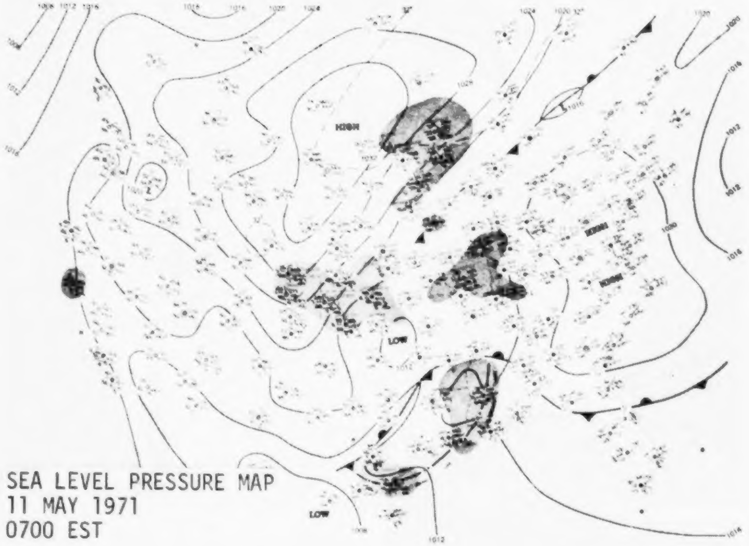
One 4 km cross section completed; no 10 or 16 km cross sections attempted to conserve flight time for GLC measurements. Very high GLC measured by helicopter in lee of distant ridge (14-15 km downwind) during early morning stable period. SO_2 from Seward plume included in GLC measurements near Conemaugh during early morning. Good coverage of inversion breakup GLC out to 28 km; partial coverage by bubblers. Plume heading diagonally across Chestnut Ridge.

Synoptic Situation

Regional - Large high dominating eastern third U.S.; NE-SW frontal trough from Iowa to eastern Quebec. Surface wind light easterly. 500-mb low over western Ontario with trough over central U.S.; ridge through Atlantic coastal states. Wind at 500 mb SW 8 mps.

Local - Sunrise broken high clouds with ground fog in valleys. Surface inversion to 600 meters; lapse above to 1110 meters. Plume wind SE 4 mps. Noon scattered high clouds. Neutral to 1080 meters. Plume wind SSE 5 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY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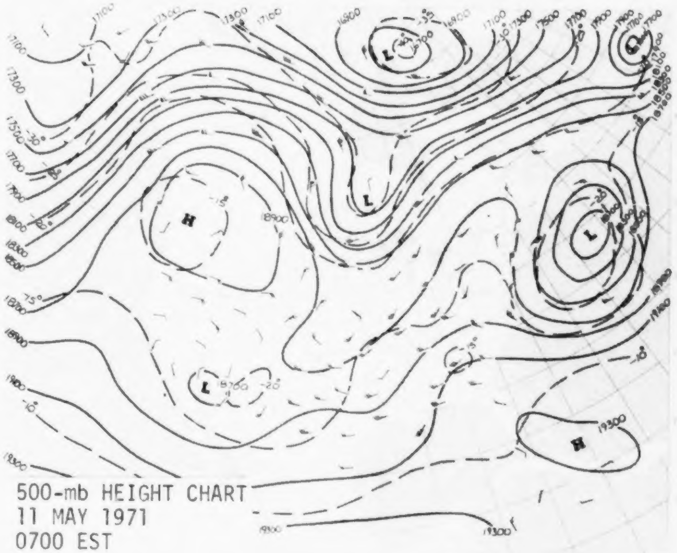
SEA LEVEL PRESSURE MAP
11 MAY 1971
0700 EST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18700
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19100
19300

500-mb HEIGHT CHART
11 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 14 May 1971 Conemaugh Plume Units 1 and 2

SO_2 Measurements

Plume Cross Section
Helicopter Peak GLC
On-stream AutoAnalyzer GLC
Helicopter Instantaneous GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

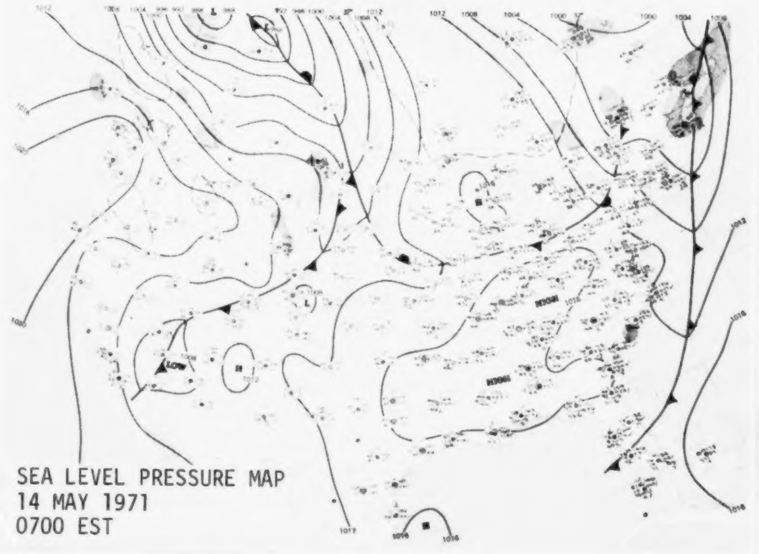
One 4 km cross section completed; no 10 or 16 km cross sections attempted because of interference by Seward plume. Good coverage of limited mixing layer GLC and looping plume GLC by helicopter out to 24 km. SO_2 from Seward plume included in GLC measurements past 4 km. Bubblers were not set out because of plume shift. AutoAnalyzer at airport office measured GLC from Homer City plume during inversion breakup and from Keystone plume under limited mixing layer. Plume heading diagonally across Laurel Ridge.

Synoptic Situation

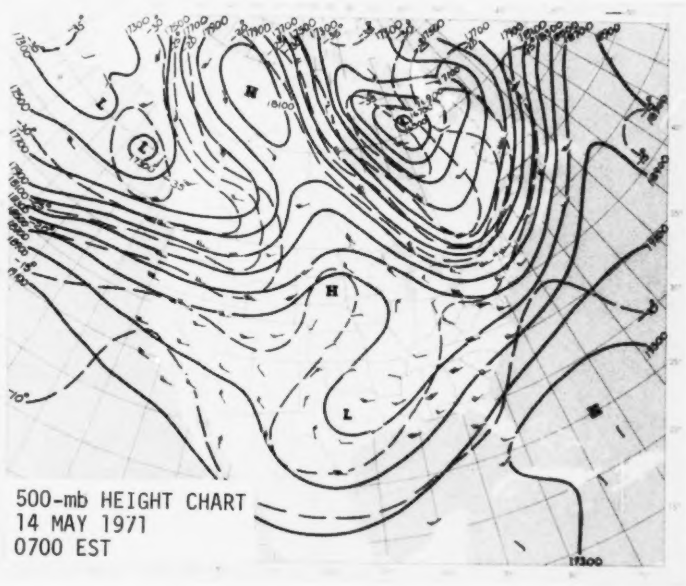
Regional - Wide ridge over eastern half U.S.; stationary front across northwestern Pennsylvania. Surface wind SW 5 mps. Deep 500-mb low over northern Quebec with trough southward through New Jersey coast; NE-SW trough over central and southeastern U.S. Wind at 500 mb NW 23 mps.

Local - Sunrise clear with fog and haze. Stable with inversions to 800 meters; lapse above to 1080 meters. Plume wind SW 8 mps. Noon scattered low and middle clouds with haze. Near-neutral to 1090 meters. Plume wind W 5 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
14 MAY 1971
0700 EST



500-mb HEIGHT CHART
14 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 15 May 1971 Conemaugh Plume Units 1 and 2

SO2 Measurements

Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

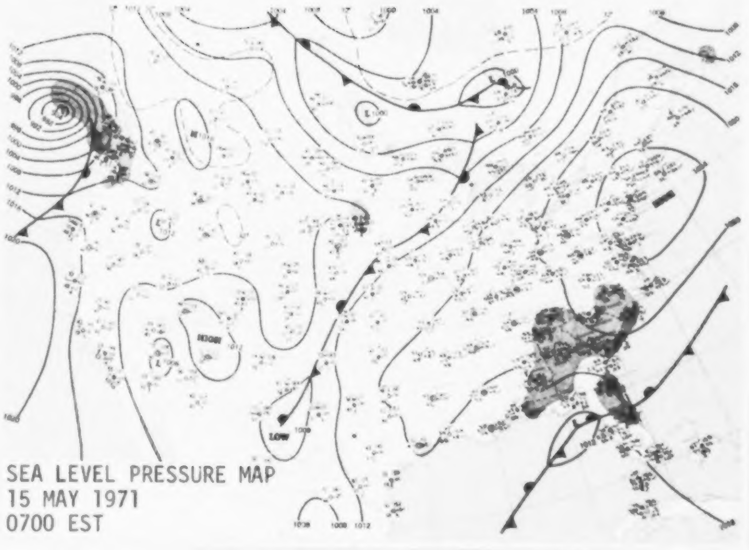
Very wide plume. No cross sections attempted to conserve flight time for GLC measurements. Very high GLC measured by helicopter in lee of distant ridge (11-12 km downwind) during early morning stable period. SO_2 from Seward plume included in GLC measurements near Conemaugh during early morning and past 4 km during remainder of sampling period. Good coverage of inversion breakup GLC and looping plume GLC by helicopter and bubblers out to 28 km. AutoAnalyzer at airport office measured GLC from Conemaugh plume during inversion breakup.

Synoptic Situation

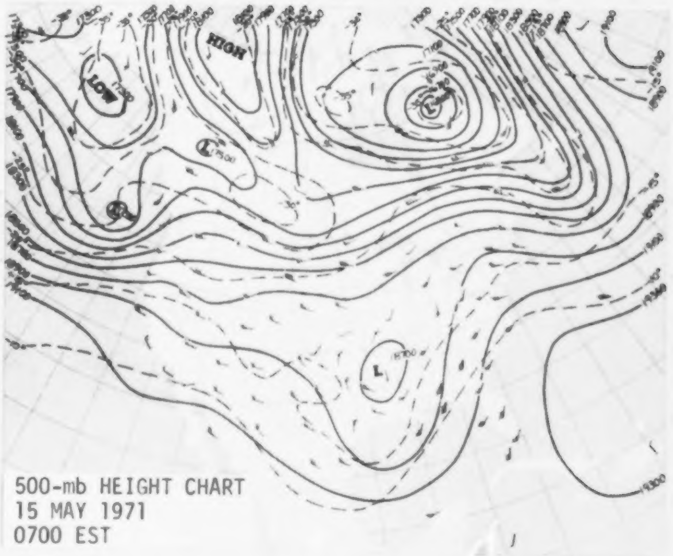
Regional - High centered off New England coast with ridge southwestward to Texas; stationary front from Ontario to western Texas. Surface wind calm. N-S 500-mb ridge through New England states; closed low over Arkansas. Wind at 500 mb SW 8 mps.

Local - Sunrise broken low clouds. Stable with inversions to 600 meters; near-neutral above to 1100 meters. Plume wind S 5 mps. 11 AM broken high clouds. Neutral to 1050 meters. Plume wind S 4 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
15 MAY 1971
0700 EST



500-mb HEIGHT CHART
15 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 17 May 1971 Conemaugh Plume Unit 1

SO_2 Measurements

Helicopter Peak GLC
Helicopter Instantaneous GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

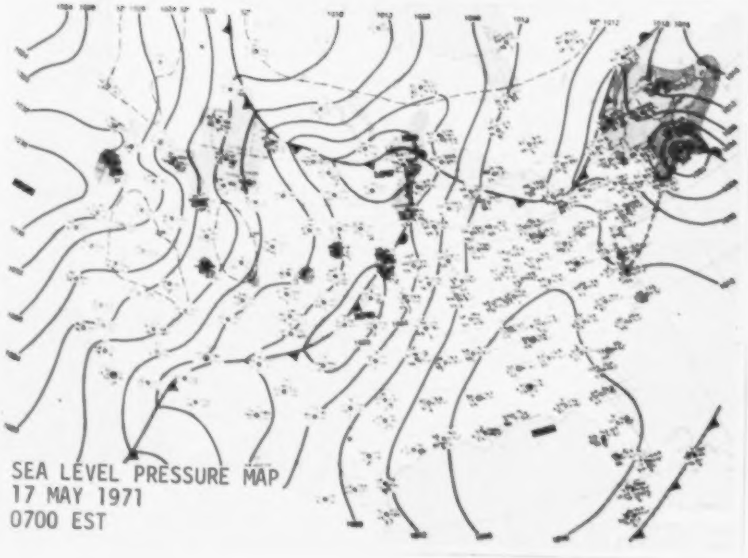
High SO_2 background at surface. Helicopter takeoff delayed by low clouds and fog. No cross sections attempted because of restricted visibility at plume level. Good coverage of limited mixing layer GLC and looping plume GLC by helicopter out to 16 km. No afternoon flight attempted because of strong low-level turbulence. Bubblers were not set out. AutoAnalyzer at airport office measured high background GLC during morning. Plume heading across Laurel Ridge.

Synoptic Situation

Regional - High centered over Alabama dominating southeastern U.S.; cold front from eastern Ontario through Lake Ontario to Lake Superior. Surface wind light southwesterly. Long-wave 500-mb trough along Atlantic coast; N-S ridge over central U.S. Wind at 500 mb NW 30 mps.

Local - 9 AM scattered low clouds. Inversion layer 760-900 meters; near-neutral below and lapse above to 1095 meters. Plume wind WSW 4 mps. 11 AM scattered low clouds. Neutral to 1095 meters. Plume wind WNW 4 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


SEA LEVEL PRESSURE MAP
17 MAY 1971
0700 EST

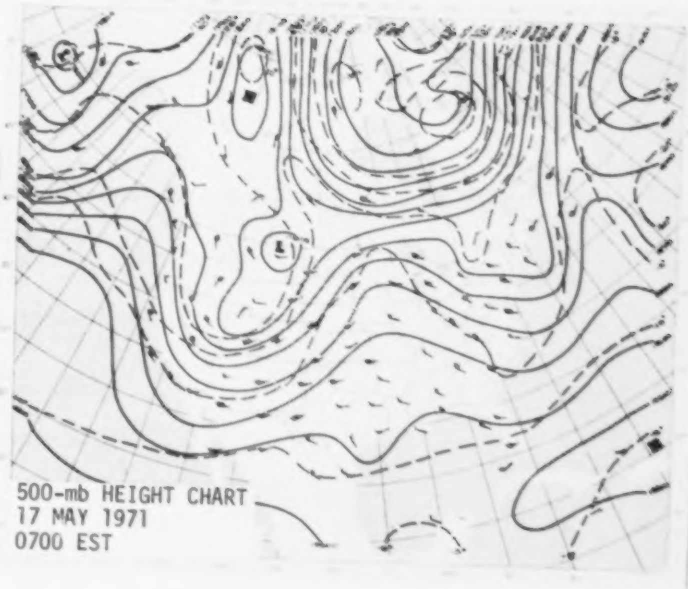

500-mb HEIGHT CHART
17 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 19 May 1971 Conemaugh Plume Unit 1

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosonde
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

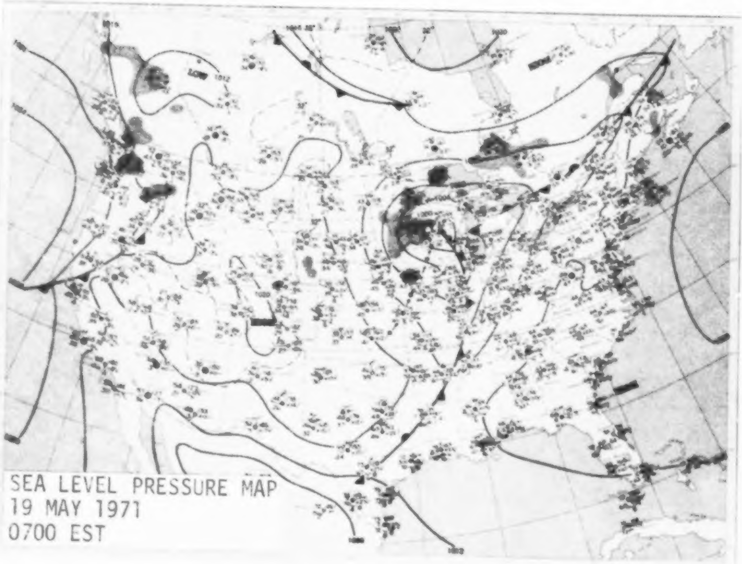
High SO_2 background at surface. Only 4 and 10 km cross sections attempted; bottom of 10 km cross section incomplete because of interference by Seward plume. Very high GLC measured by helicopter in lee of distant ridge (19-20 km downwind) during early morning stable period. SO_2 from Seward plume included in GLC measurements near Conemaugh during early morning. Helicopter flights discontinued at 9 AM because of plant shutdown. After Conemaugh ceased operation, bubblers were left in place to measure GLC from Seward plume. AutoAnalyzer at airport office measured high background GLC during morning. No afternoon radiosonde released.

Synoptic Situation

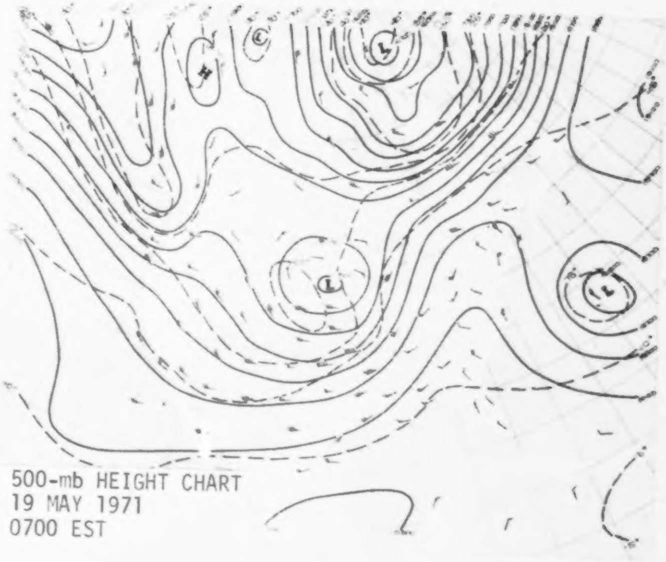
Regional - Closed low over Wisconsin with cold front through Illinois to Texas and stationary front to northern Maine; high over southeastern U.S. Surface wind light southerly. 500-mb ridge over Atlantic coastal states; closed low over South Dakota with trough southward. Wind at 500 mb SW 8 mps.

Local - Sunrise clear with ground fog in valleys. Surface inversion to 515 meters; lapse above to 1095 meters. Plume wind SSW 4 mps. 9 AM clear. Stable with inversions to 500 meters; neutral above to 1100 meters. Plume wind SW 6 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
19 MAY 1971
0700 EST



500-mb HEIGHT CHART
19 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

April 1971 Series 20 May 1971 Conemaugh Plume Unit 1

SO$_2$ Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC

Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles

Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

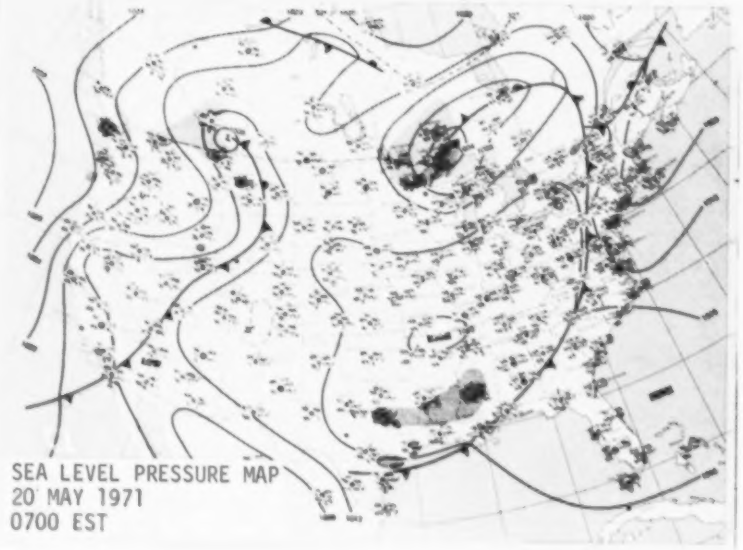
Helicopter takeoff delayed by fog. Extremely wide plume. Two 4 km and one 10 km cross sections attempted; tops of both 4 km cross sections incomplete because of low clouds and haze. Only two traverses made at 10 km to conserve flight time for GLC measurements. Second 4 km cross section flown to define plume shift; bottom was at the surface. Both 4 km cross sections reveal shifting wind direction. Good coverage of limited mixing layer GLC and looping plume GLC by helicopter out to 26 km after plume shift; partial coverage by bubblers. Plume heading across Laurel Ridge after wind shift.

Synoptic Situation

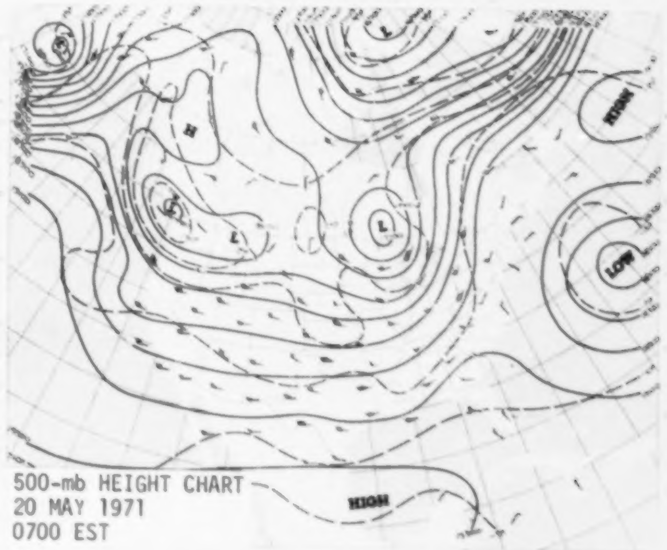
Regional - Cold front from southern Quebec through Georgia to Texas; closed low over Lake Superior. Large high over central U.S. Surface wind light northerly. Closed 500-mb low over Lake Superior with trough southward through Louisiana; ridge along Atlantic coast. Wind at 500 mb SW 20 mps.

Local - 8 AM scattered low clouds with haze; ground fog in valleys. Stable with inversions 100-850 meters; neutral below and lapse above to 1100 meters. Plume wind NE 2 mps. Noon scattered low clouds with haze. Neutral to 1100 meters. Plume wind SW 2 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
20 MAY 1971
0700 EST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500-mb HEIGHT CHART
20 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

Brookhaven Plume Tracking Study 24 May 1971 Keystone Plume Unit 2

SO_2 Measurements

On-stream AutoAnalyzer GLC

Meteorological Measurements

Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

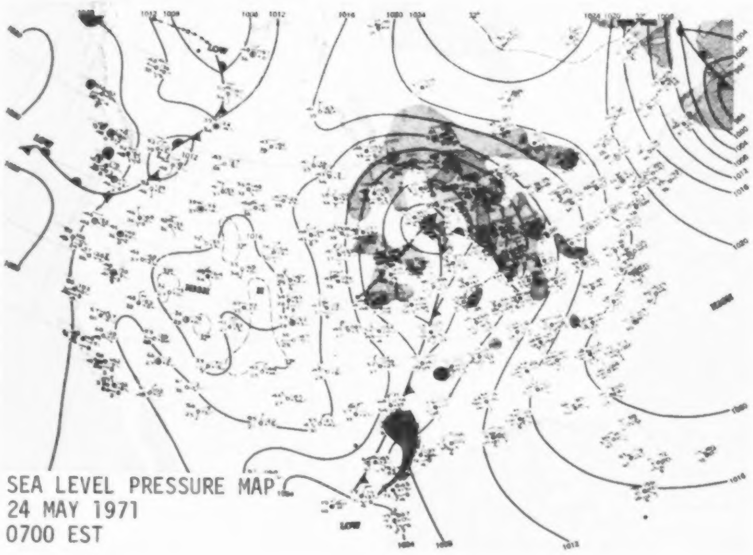
LAPPES series not in progress. No upper air wind or temperature measurements obtained by LAPPES personnel in support of Brookhaven activities.

Synoptic Situation

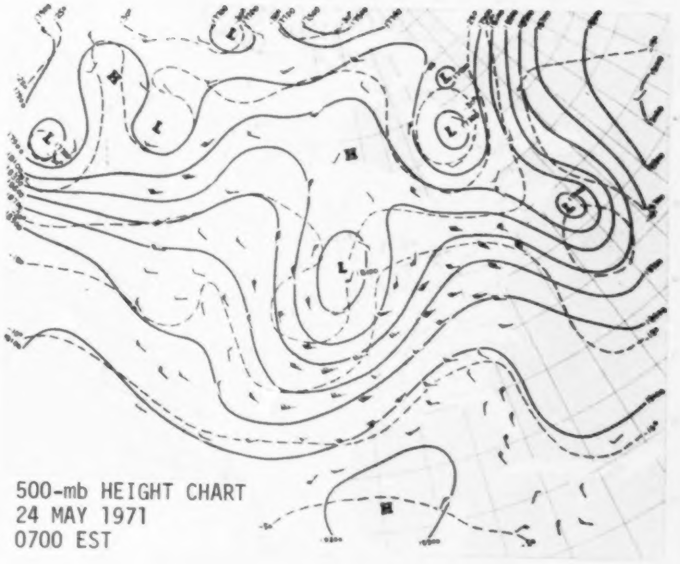
Regional - Closed low over Minnesota-Wisconsin border with cold front southward through Texas and warm front to Kentucky; ridge along southern Atlantic coast. Surface wind light southeasterly. Closed 500-mb low over Dakota-Minnesota border with trough southwestward to Mexico; NE-SW ridge over eastern third U.S. Wind at 500 mb W 18 mps.

Local - 6 PM middle scattered, high overcast. 8 PM middle scattered, high overcast. No helicopter temperature profiles or plume winds available; airport surface data listed in Table 2.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
24 MAY 1971
0700 EST



500-mb HEIGHT CHART
24 MAY 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

Brookhaven Plume Tracking Study 8 October 1971 Keystone Plume Units 1 and 2

SO_2 Measurements

On-stream AutoAnalyzer GLC

Meteorological Measurements

Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

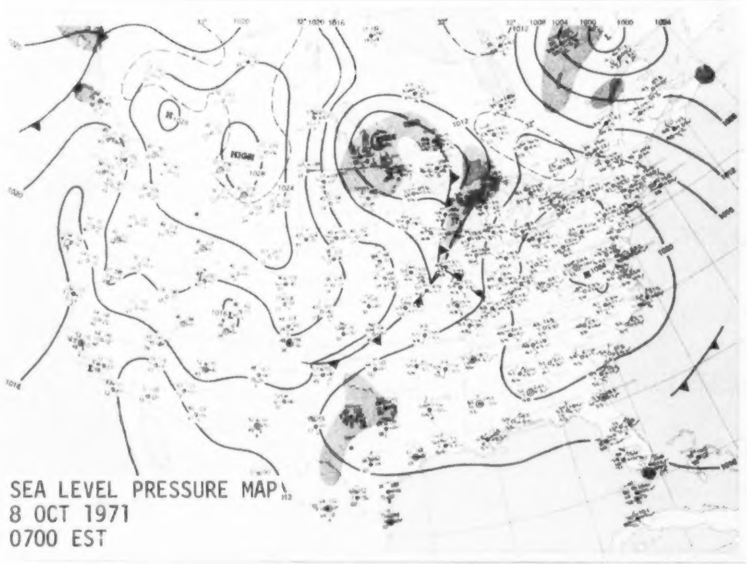
LAPPES series not in progress. No upper air wind or temperature measurements obtained by LAPPES personnel in support of Brookhaven activities.

Synoptic Situation

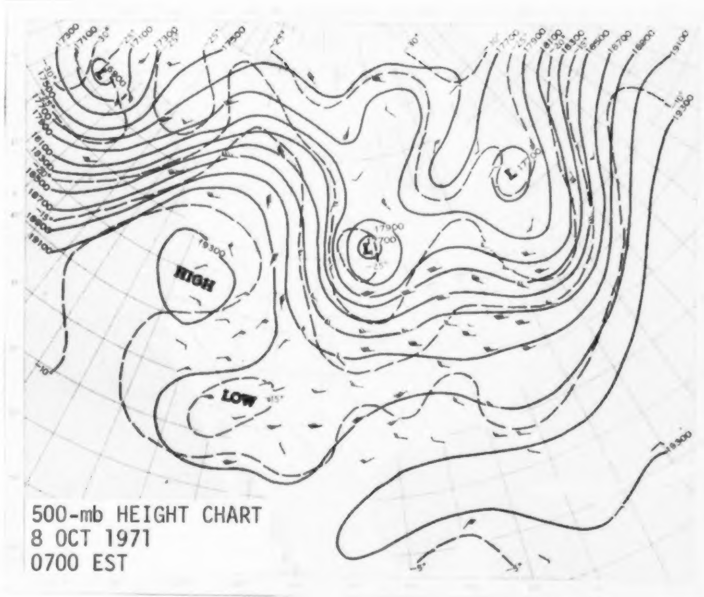
Regional - Eastern third U.S. dominated by high centered over Virginia; ridge from Nova Scotia through Alabama to Texas. Surface wind light southeasterly. N-S 500-mb troughs along Atlantic coast and over central U.S.; weak ridge over Great Lakes. Wind at 500 mb W 20 mps.

Local - 8 AM scattered low and high clouds. 7 PM low scattered, high overcast. No helicopter temperature profiles or plume winds available; airport surface data listed in Table 2.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
8 OCT 1971
0700 EST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19100
19300

500-mb HEIGHT CHART
8 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

Brookhaven Plume Tracking Study 10 October 1971 Keystone Plume Units 1 and 2

SO_2 Measurements

On-stream AutoAnalyzer GLC

Meteorological Measurements

Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

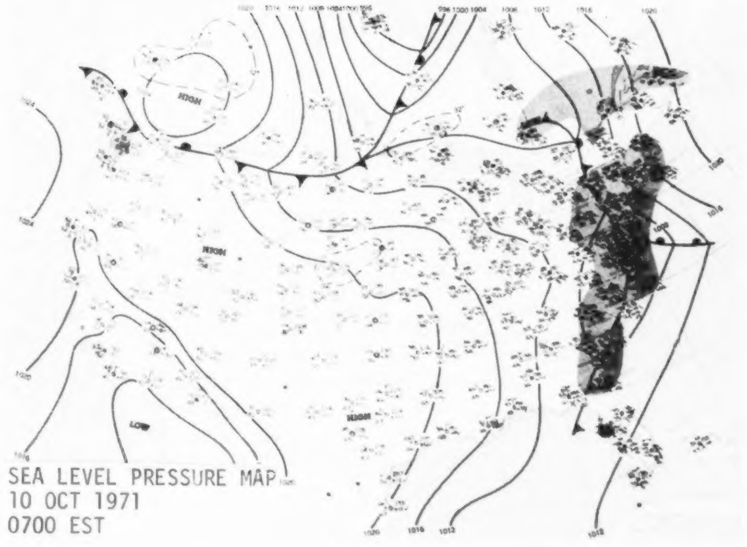
LAPPES series not in progress. No upper air wind or temperature measurements obtained by LAPPES personnel in support of Brookhaven activities.

Synoptic Situation

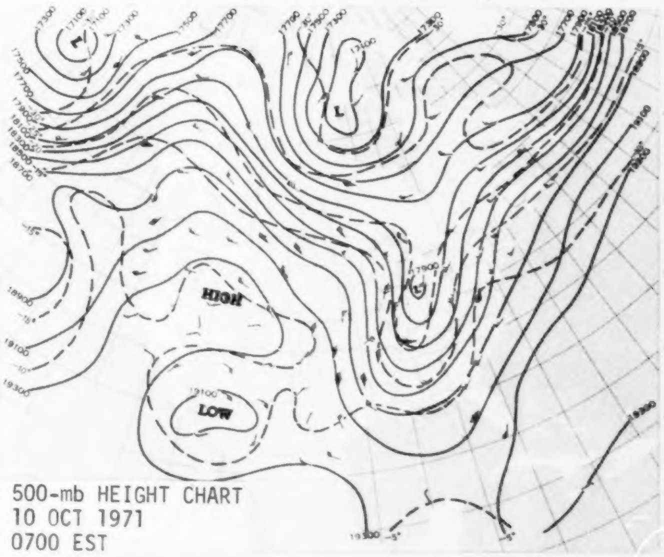
Regional - Closed low over Delaware with cold front southwestward through Florida Gulf coast and stationary front northward to western Quebec; E-W gradient from Atlantic coastal states westward through central U.S. Surface wind light westerly. Closed 500-mb low over northern Illinois with wide trough over eastern half U.S. Wind at 500 mb SSW 35 mps.

Local - 1 PM overcast low clouds. 3 PM overcast low clouds. No helicopter temperature profiles or plume winds available; airport surface data listed in Table 2.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


HIGH
HIGH
HIGH
LOW
LOW
1024
1020
1016
1012

SEA LEVEL PRESSURE MAP
10 OCT 1971
0700 EST


L
L
HIGH
LOW
17500
17700
18100
18300
18500
18700
18900
19100
19300

500-mb HEIGHT CHART
10 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

Brookhaven Plume Tracking Study 12 October 1971 Keystone Plume Units 1 and 2

SO_2 Measurements

On-stream AutoAnalyzer GLC

Meteorological Measurements

Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

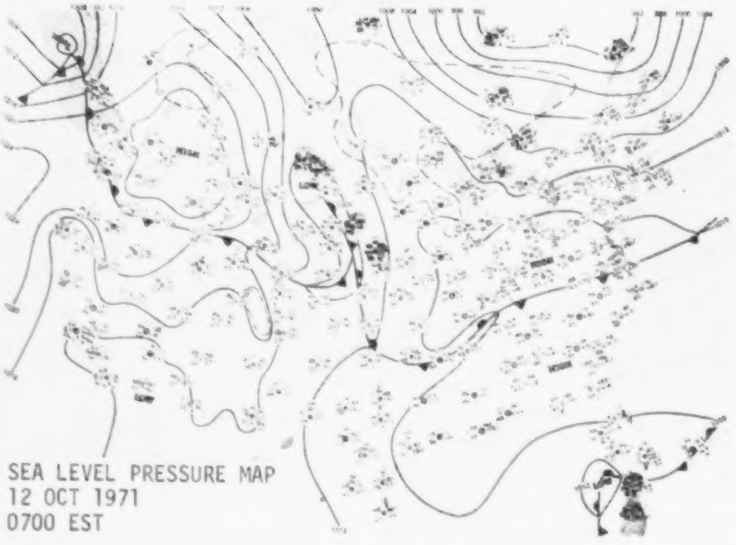
LAPPES series not in progress. No upper air wind or temperature measurements obtained by LAPPES personnel in support of Brookhaven activities.

Synoptic Situation

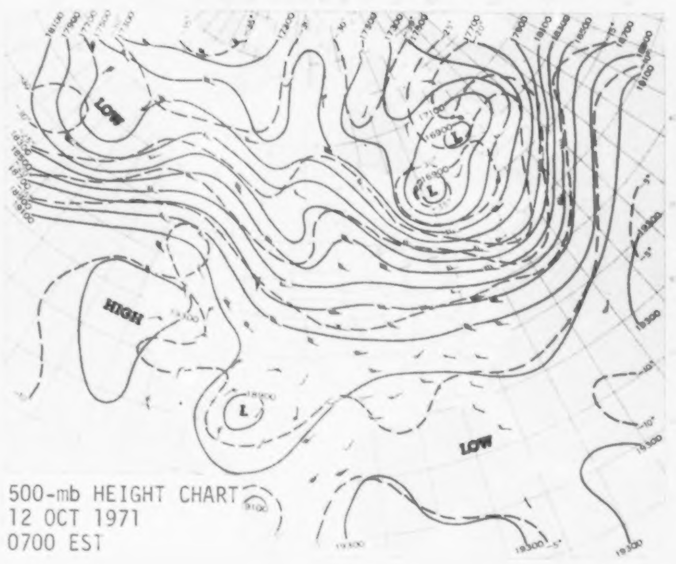
Regional - Weak NE-SW troughs along New England coast and over Great Lakes; weak ridge over remainder of eastern third U.S. E-W cold front through Kentucky and Virginia. Surface wind light northwesterly. Long-wave 500-mb trough along Atlantic coast; near-zonal flow over eastern third U.S. Wind at 500 mb W 25 mps.

Local - Noon scattered low and high clouds. 7 PM scattered high clouds. No helicopter temperature profiles or plume winds available; airport surface data listed in Table 2.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


HIGH
LOW
HIGH
HIGH
LOW

SEA LEVEL PRESSURE MAP
12 OCT 1971
0700 EST


LOW
L
L
HIGH
L
LOW

500-mb HEIGHT CHART
12 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

Brookhaven Plume Tracking Study 13 October 1971 Keystone Plume Units 1 and 2

SO_2 Measurements

On-stream AutoAnalyzer GLC

Meteorological Measurements

Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

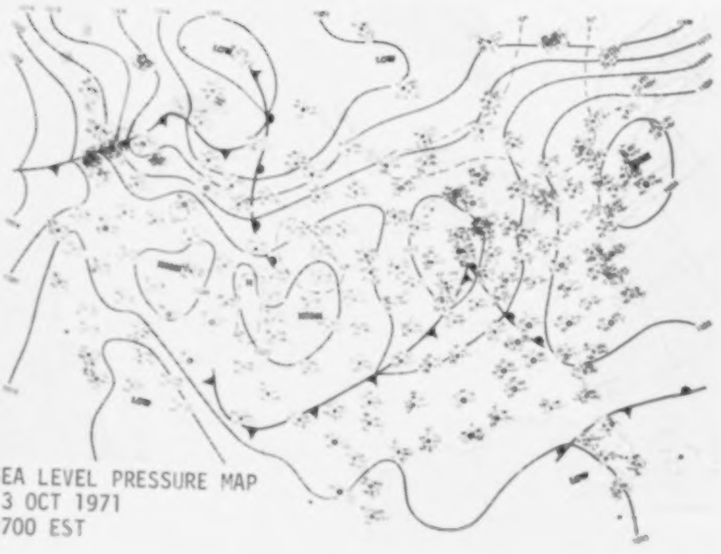
LAPPES series not in progress. No upper air wind or temperature measurements obtained by LAPPES personnel in support of Brookhaven activities.

Synoptic Situation

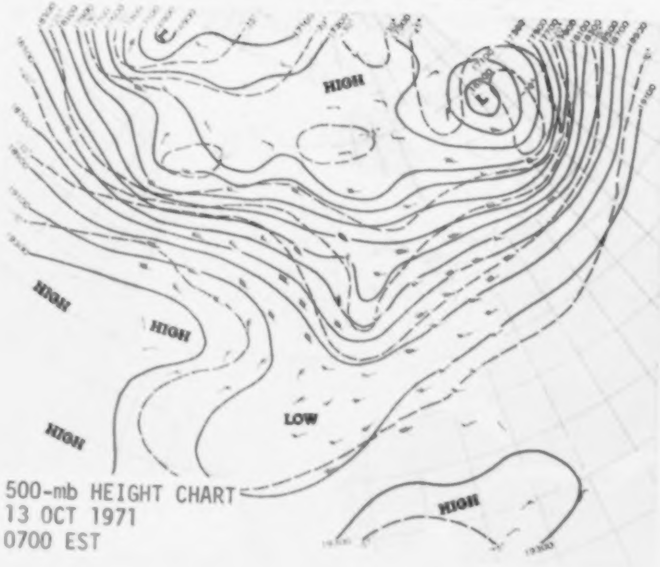
Regional - Closed low over northern Illinois with cold front to western Texas and warm front to northern Georgia; high off New England coast. Surface wind light southeasterly. N-S 500-mb trough over central U.S.; near-zonal flow over eastern third U.S. Wind at 500 mb W 18 mps.

Local - 7 AM clear. 10 AM clear. No helicopter temperature profiles or plume winds available; airport surface data listed in Table 2.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


LOW
LOW
LOW
LOW
HIGH

SEA LEVEL PRESSURE MAP
13 OCT 1971
0700 EST


HIGH
L
HIGH
HIGH
HIGH
LOW
HIGH

500-mb HEIGHT CHART
13 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

Brookhaven Plume Tracking Study 14 October 1971 Keystone Plume Units 1 and 2

SO_2 Measurements

On-stream AutoAnalyzer GLC

Meteorological Measurements

Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

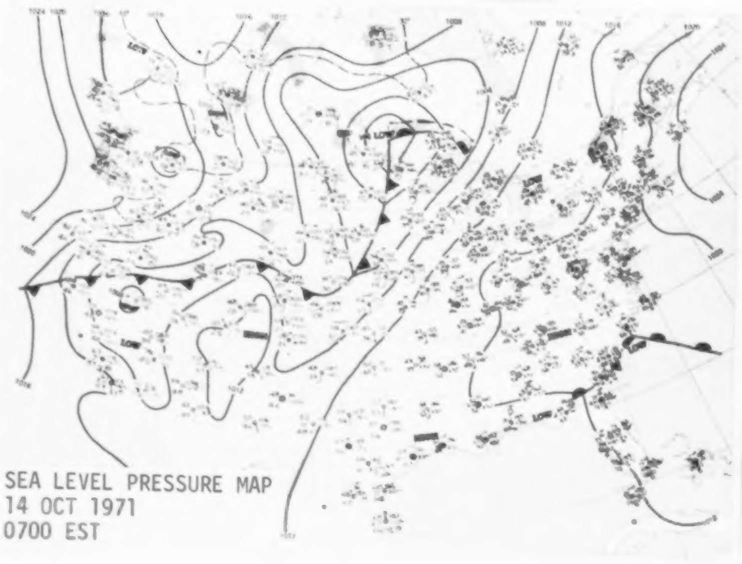
LAPPES series not in progress. No upper air wind or temperature measurements obtained by LAPPES personnel in support of Brookhaven activities.

Synoptic Situation

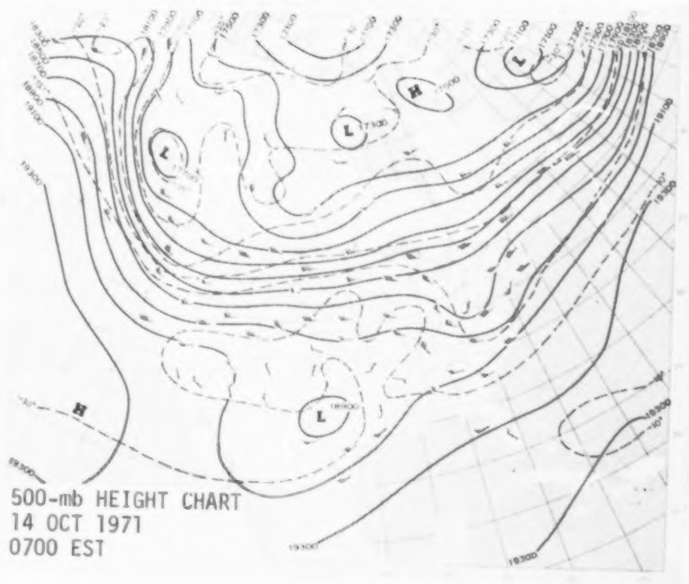
Regional - Weak ridge over eastern third U.S.; closed low over southwestern Ontario. Surface wind light southwesterly. N-S 500-mb trough over northeastern U.S.; closed low over Texas. Wind at 500 mb SW 5 mps.

Local - 6 PM scattered high clouds. 9 PM clear. No helicopter temperature profiles or plume winds available; airport surface data listed in Table 2.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
14 OCT 1971
0700 EST



500-mb HEIGHT CHART
14 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

Brookhaven Plume Tracking Study 15 October 1971 Keystone Plume Unit 2

SO_2 Measurements

On-stream AutoAnalyzer GLC

Meteorological Measurements

Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

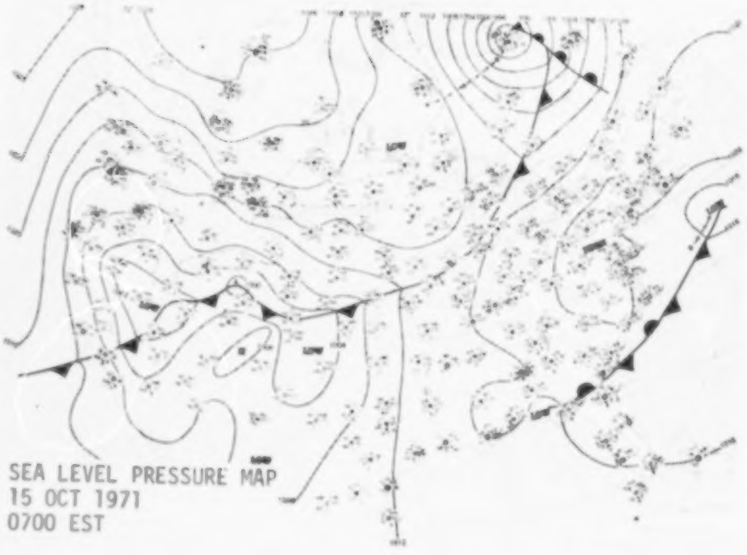
LAPPES series not in progress. No upper air wind or temperature measurements obtained by LAPPES personnel in support of Brookhaven activities.

Synoptic Situation

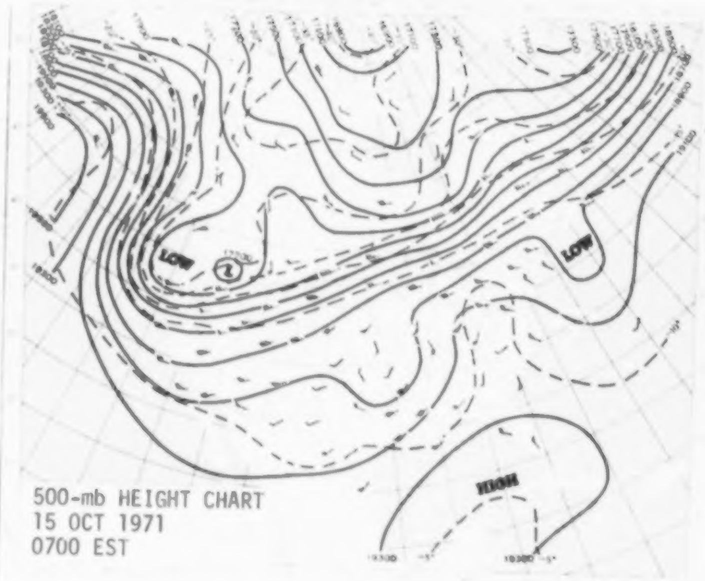
Regional - NE-SW ridge over eastern third U.S.; cold front from central Quebec through Lake Michigan southwestward to southern California. Surface wind light southeasterly. N-S 500-mb ridge over eastern third U.S.; NW-SE trough over south central U.S. Wind at 500 mb WNW 13 mps.

Local - 7 AM clear. 11 AM scattered low clouds. No helicopter temperature profiles or plume winds available; airport surface data listed in Table 2.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
15 OCT 1971
0700 EST


LOW
LOW
HIGH

500-mb HEIGHT CHART
15 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 18 October 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

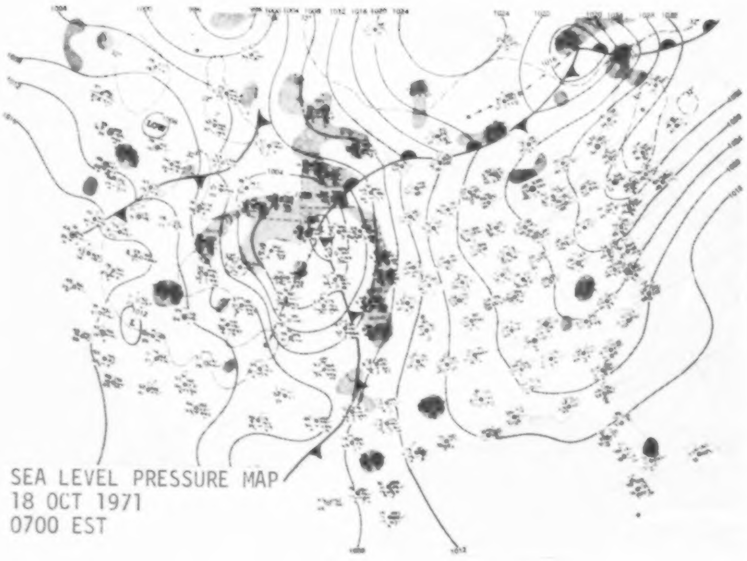
Only 4 and 10 km cross sections completed; no 16 km cross section attempted to conserve flight time for GLC measurements. Good coverage of limited mixing layer GLC and looping plume GLC by helicopter out to 24 km; partial coverage by bubblers. Low-altitude termination of most pilot balloons caused by low clouds. Plume heading diagonally across Chestnut Ridge. Area under air stagnation advisory.

Synoptic Situation

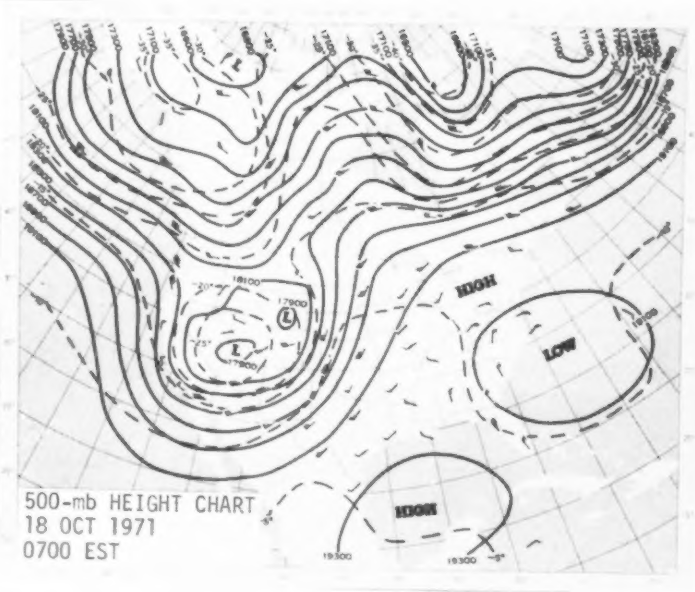
Regional - Closed low over central Quebec with front southwestward to closed low in South Dakota; NE-SW ridge over eastern third U.S. Surface wind light easterly. Weak 500-mb gradient over eastern third U.S.; long-wave 500-mb trough over western U.S. Wind at 500 mb E 8 mps.

Local - Sunrise scattered low clouds near Conemaugh; clear beyond Chestnut Ridge. Mostly stable to 1050 meters; superadiabatic layers 550-600 and 960-980 meters. Plume wind SSE 5 mps. 11 AM clear. Near-neutral to 700 meters; stable with inversions above to 1050 meters. Plume wind SE 3 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
18 OCT 1971
0700 EST


L
18100
17900
L
17900
HIGH
LOW
HIGH
19300
19300

500-mb HEIGHT CHART
18 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 19 October 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

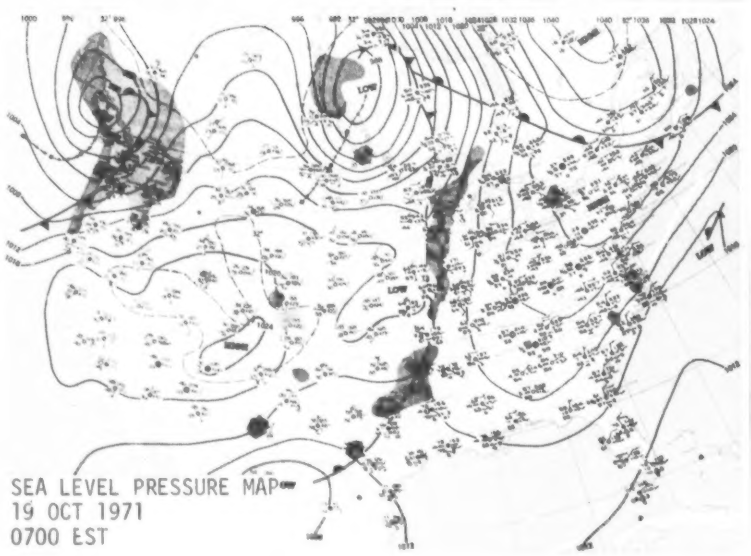
Three cross sections completed; bottoms were at the surface. Good coverage of limited mixing layer GLC and looping plume GLC by helicopter out to 28 km. Good coverage of limited mixing layer GLC by four bubblers; remaining bubblers were outside plume boundary. Low-altitude termination of first few pilot balloons caused by steam plume interference. Plume heading across Chestnut Ridge. Area under air stagnation advisory.

Synoptic Situation

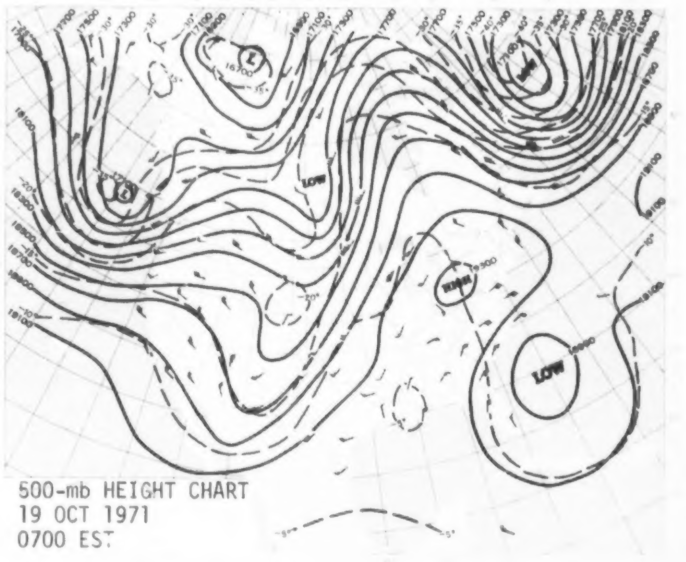
Regional - Closed low over Manitoba with fronts southward through Texas and southeastward through Maine coast; NE-SW ridge over eastern third U.S. Surface wind light easterly. Closed 500-mb high over Ohio-Pennsylvania border with weak NE-SW ridge over eastern third U.S. Wind at 500 mb NE 8 mps.

Local - Sunrise clear. Stable with inversions to 1290 meters. Plume wind ESE 5 mps. 2 PM clear. Neutral to 850 meters; stable above to 1085 meters. Plume wind (from radiosonde) ESE 4 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
19 OCT 1971
0700 EST


LOW
HIGH
LOW

500-mb HEIGHT CHART
19 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 20 October 1971 Conemaugh Plume Unit 2

SO2 Measurements

Plume Cross Section
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

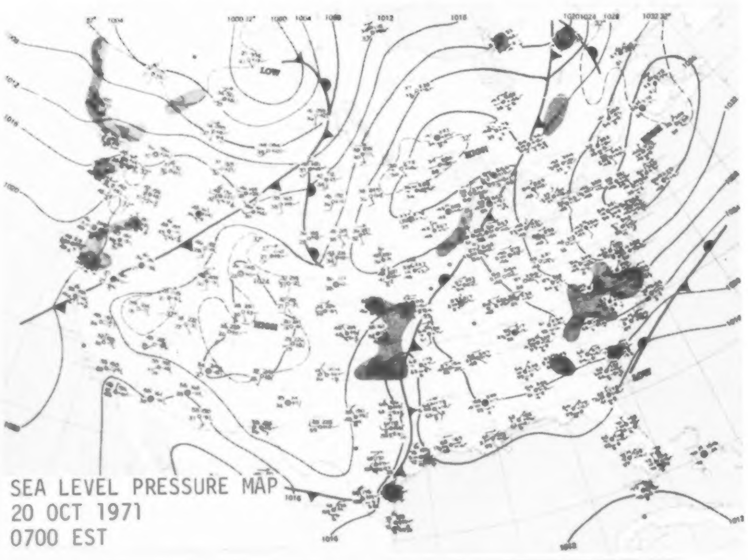
One 4 km cross section completed; bottom was at the surface. No 10 or 16 km cross sections attempted because of strong winds and poor visibility at plume level. Good coverage by helicopter of GLC due to lee side flow off Laurel Ridge under moderate wind, neutral conditions during early morning and of limited mixing layer GLC during late morning. Bubblers measured mostly zero GLC because of placement too far northeast. Low-altitude termination of most pilot balloons caused by low clouds. Plume heading across Chestnut Ridge. Area under air stagnation advisory.

Synoptic Situation

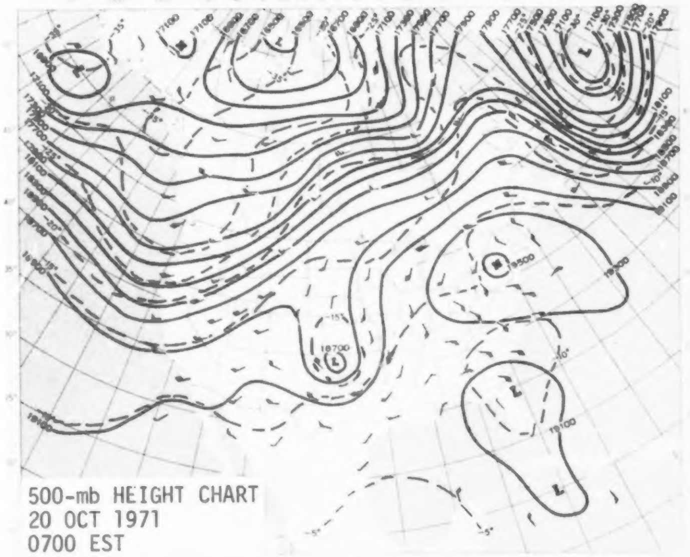
Regional - Cold front from central Quebec to southern Texas; NE-SW ridge over Atlantic and Gulf coastal states. Surface wind light easterly. Closed 500-mb high over northern Pennsylvania; weak gradient over eastern half U.S.with closed low over western Oklahoma. Wind at 500 mb SSE 13 mps.

Local - Sunrise broken low clouds with fog and haze near Conemaugh; clear beyond Chestnut Ridge. Near-neutral to 525 meters; stable with inversions above to 1350 meters. Plume wind SSW 7 mps. 11 AM scattered low clouds. Neutral to 850 meters; inversion above to 1240 meters. Plume wind ESE 5 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
20 OCT 1971
0700 EST



500-mb HEIGHT CHART
20 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 21 October 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Section
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

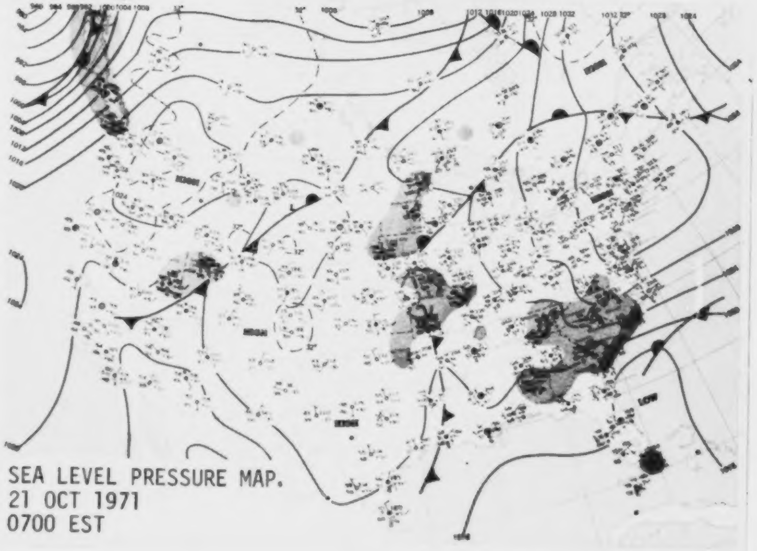
One 4 km cross section completed; no 10 or 16 km cross sections attempted because of helicopter voltage regulator malfunction. Partial coverage of inversion breakup GLC and good coverage of limited mixing layer GLC by helicopter out to 32 km. Ground-level flight discontinued to permit helicopter repair. Bubblers picked up after two hours because of plume shift. AutoAnalyzer at airport office measured GLC from Conemaugh plume during late-morning wind shift.

Synoptic Situation

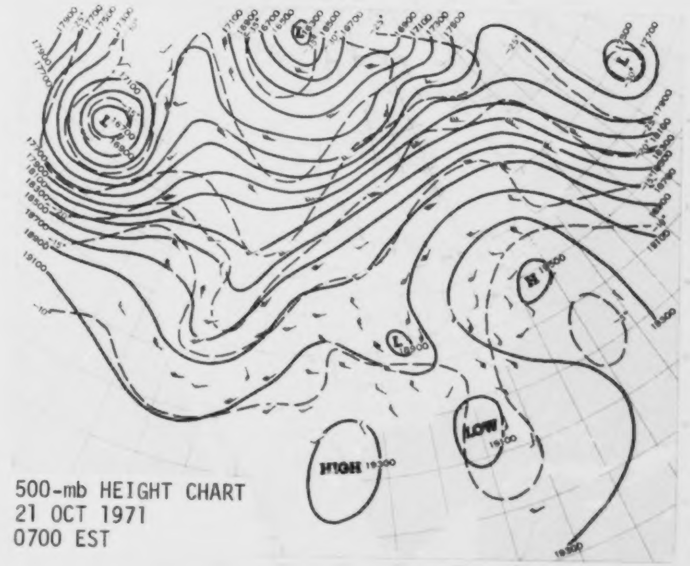
Regional - Stationary front from Iowa through Sault Ste. Marie and Maine coast; warm front from Iowa through Louisiana coast. Ridge over eastern third U.S. Surface wind light southeasterly. Closed 500-mb high off New Jersey coast with ridge northwestward; closed low over Missouri. Wind at 500 mb SSW 8 mps.

Local - Sunrise clear with ground fog in valleys. Inversion layers to 200 meters and 400-950 meters; lapse between and above to 1250 meters. Plume wind S 4 mps. 1030 AM clear. Near-neutral to 300 meters; stable with inversions above to 1125 meters. Plume wind SE 1 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP.
21 OCT 1971
0700 EST



500-mb HEIGHT CHART
21 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 22 October 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

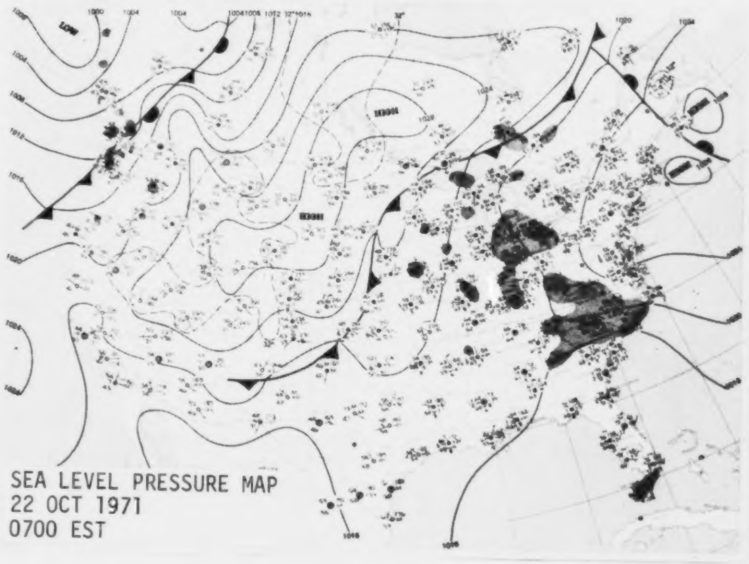
Only 4 and 10 km cross sections completed; bottom of 10 km cross section was at the surface. No 16 km cross section attempted because of low fuel supply. Good coverage of limited mixing layer GLC by helicopter out to 25 km. No afternoon flight attempted. Bubblers measured mostly zero GLC because of placement too far west. AutoAnalyzer at airport office measured GLC from Conemaugh plume under limited mixing layer. Low-altitude termination of pilot balloons caused by low clouds.

Synoptic Situation

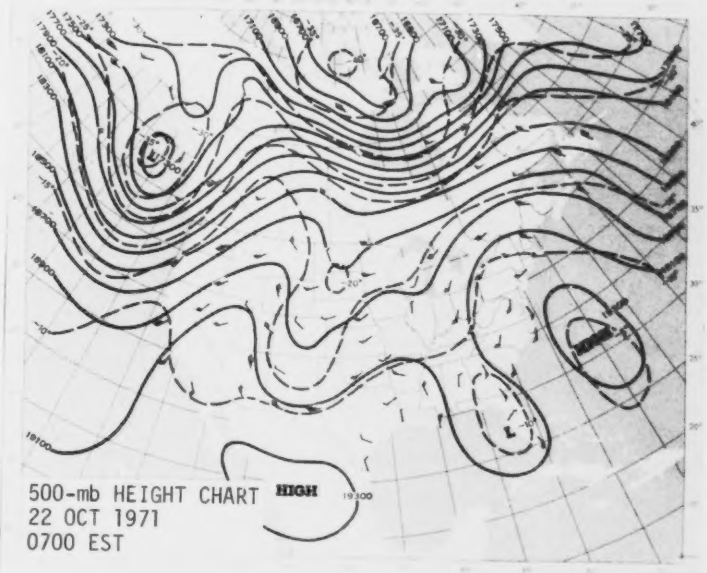
Regional - Weak cold front from eastern Quebec through Minnesota to New Mexico; ridge from New England coast southwestward to Texas. Surface wind light easterly. 500-mb trough from Wisconsin to western Cuba; NW-SE ridge over northeastern U.S. Wind at 500 mb SW 13 mps.

Local - Sunrise broken low clouds. Stable with inversions to 1085 meters. Plume wind SSE 7 mps. 11 AM low overcast. Near-neutral to 750 meters; stable above to 1100 meters. Plume wind S 4 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
22 OCT 1971
0700 EST



500-mb HEIGHT CHART
22 OCT 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 2 November 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Section
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

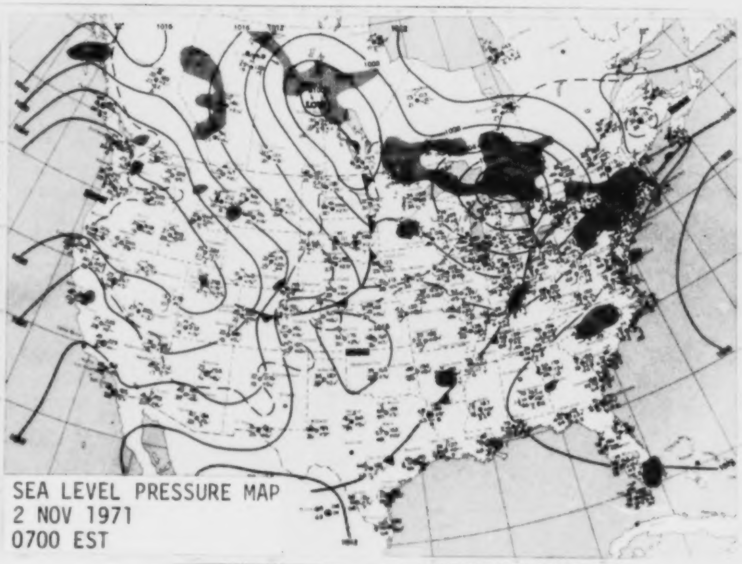
One 4 km cross section attempted; top incomplete and no 10 or 16 km cross sections attempted because of strong winds and turbulence at plume level. Partial coverage of high wind, neutral GLC by helicopter and bubblers out to 24 km. SO_2 from Seward plume included in GLC measurements past 4 km. Ground-level flights discontinued because of strong low-level turbulence. Low-altitude termination of pilot balloons and one temperature profile caused by low clouds.

Synoptic Situation

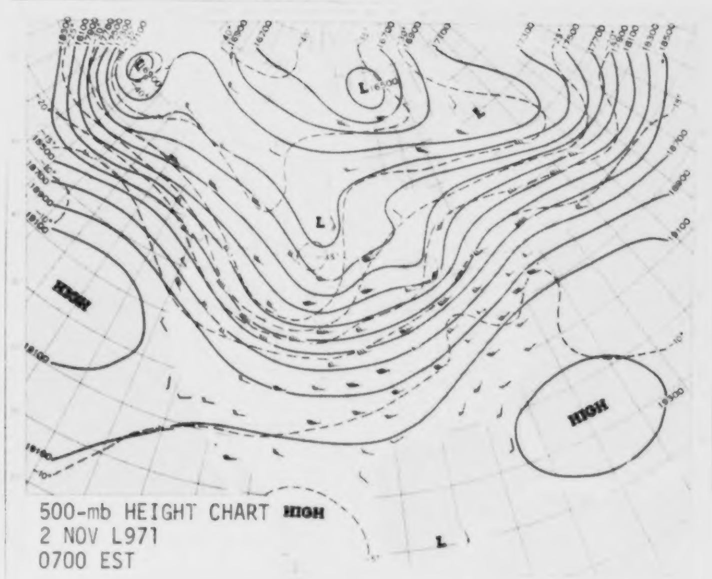
Regional - Deep low centered over Sault Ste. Marie with cold front through western Kentucky to Mexico and warm front through Massachusetts coast; E-W ridge over southeastern U.S. Surface wind SW 8 mps. Eastern U.S. under leading edge of long-wave 500-mb trough. Wind at 500 mb WSW 25 mps.

Local - Sunrise low overcast with light rain showers. Stable with inversions to 350 meters; near-neutral above to 720 meters. Plume wind SW 13 mps. Noon low overcast with light rain showers. Noon helicopter temperature profile not available. Plume wind SW 8 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
2 NOV 1971
0700 EST


HIGH
HIGH
HIGH
L
L
L
L
L

500-mb HEIGHT CHART
2 NOV L971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 3 November 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Section
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

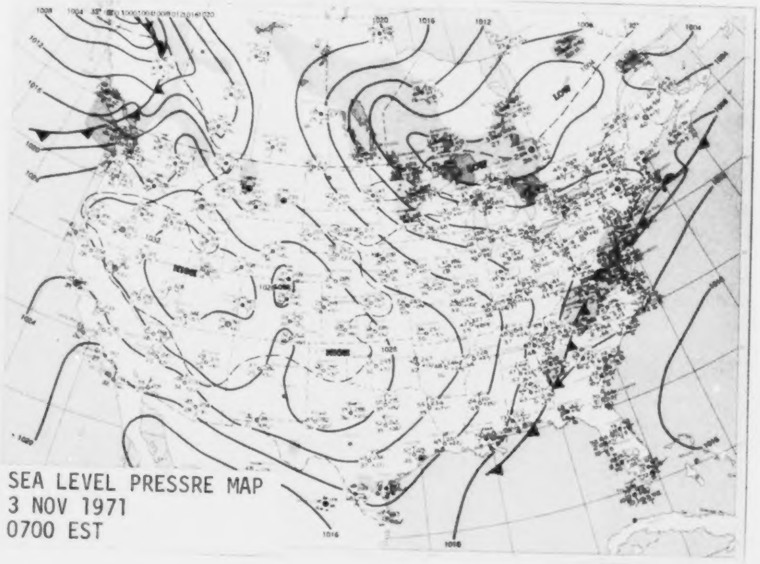
Helicopter takeoff delayed by fog and low clouds. One 4 km cross section completed; bottom was at the surface. No 10 or 16 km cross sections attempted because of low clouds over Johnstown. Good coverage of moderate-to-high wind, neutral GLC by helicopter out to 20 km; partial coverage by bubblers. SO_2 from Seward plume included in GLC measurements past 4 km. AutoAnalyzer at airport office measured GLC from Keystone plume during midday. Low-altitude termination of most pilot balloons caused by low clouds. Plume heading across Laurel Ridge.

Synoptic Situation

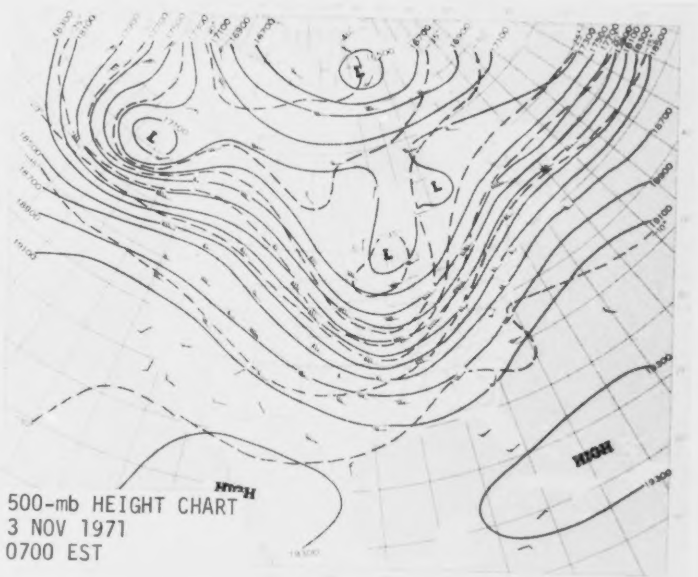
Regional - NE-SW frontal trough from Nova Scotia through western Florida coast; ridge from northern Texas to New England coast. Surface wind light southwesterly. Eastern U.S. under leading edge of long-wave 500-mb trough. Wind at 500 mb SW 30 mps.

Local - 9 AM low overcast with fog. Near-neutral to 950 meters; inversion above to 1085 meters. Plume wind SW 3 mps. 1 PM broken low clouds with haze. Near-neutral to 1070 meters. Plume wind WSW 10 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


LOW
LOW
HIGH
HIGH
1016
1016
1020
1012

SEA LEVEL PRESSRE MAP
3 NOV 1971
0700 EST


L
L
L
L
HIGH
HIGH

500-mb HEIGHT CHART
3 NOV 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 4 November 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Section
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

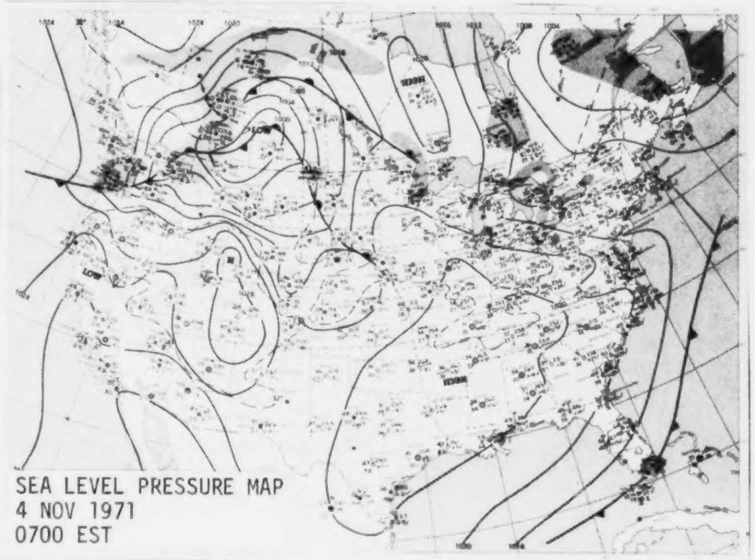
One 4 km cross section completed; bottom was at the surface. No 10 or 16 km cross sections attempted because of turbulence at plume level. Few moderate-to-high wind, neutral GLC measured by helicopter before strong low-level turbulence forced termination of flights. Good coverage of neutral GLC by bubblers. Low-altitude termination of first few pilot balloons caused by steam plume interference. Plume heading across Laurel Ridge.

Synoptic Situation

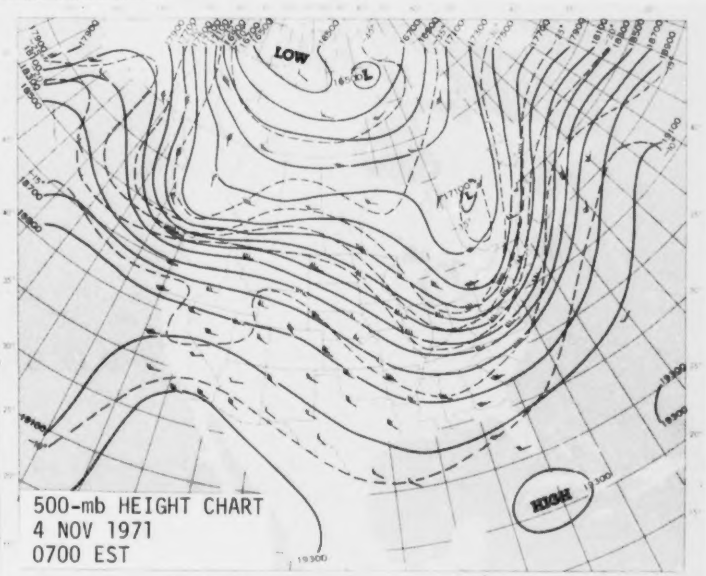
Regional - Large high centered over Arkansas dominating eastern half U.S. Surface wind W 5 mps. Long-wave 500-mb trough centered over eastern U.S.; closed low over central Quebec. Wind at 500 mb W 40 mps.

Local - Sunrise scattered low clouds. Near-neutral to 1050 meters; isothermal above to 1075 meters. Plume wind W 8 mps. Noon broken low clouds. Noon helicopter temperature profile not available. Plume wind WSW 9 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


LOW
LOW
HIGH
HIGH

SEA LEVEL PRESSURE MAP
4 NOV 1971
0700 EST


LOW
L
HIGH
19300

500-mb HEIGHT CHART
4 NOV 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 5 November 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

Brookhaven National Laboratory (airborne densitometer and sulfur hexaflouride tracking of Keystone plume)

Commentary

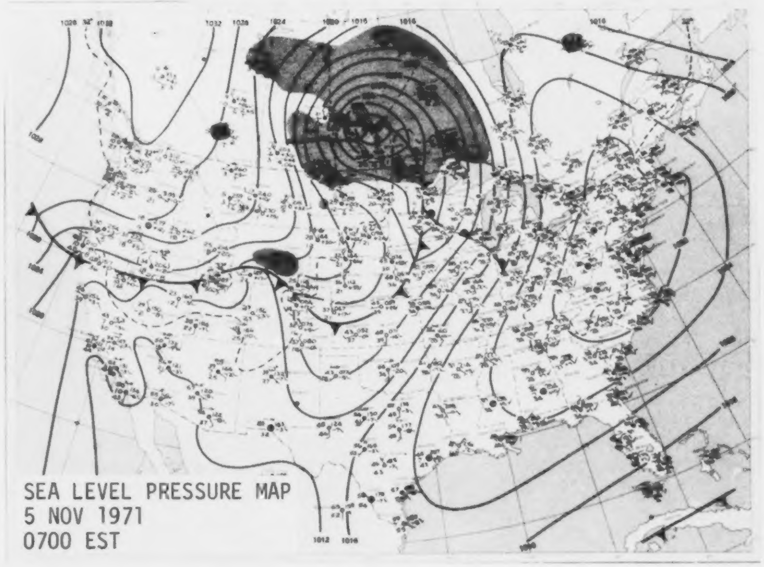
Three cross sections completed. Bottom traverse of 16 km cross section contains SO_2 from Seward plume. Partial coverage of inversion breakup GLC and good coverage of limited mixing layer GLC by helicopter out to 30 km. Partial coverage of limited mixing layer GLC by bubblers. SO_2 from Seward plume included in GLC measurements past 4 km. AutoAnalyzer at airport office measured GLC from Homer City plume during inversion breakup.

Synoptic Situation

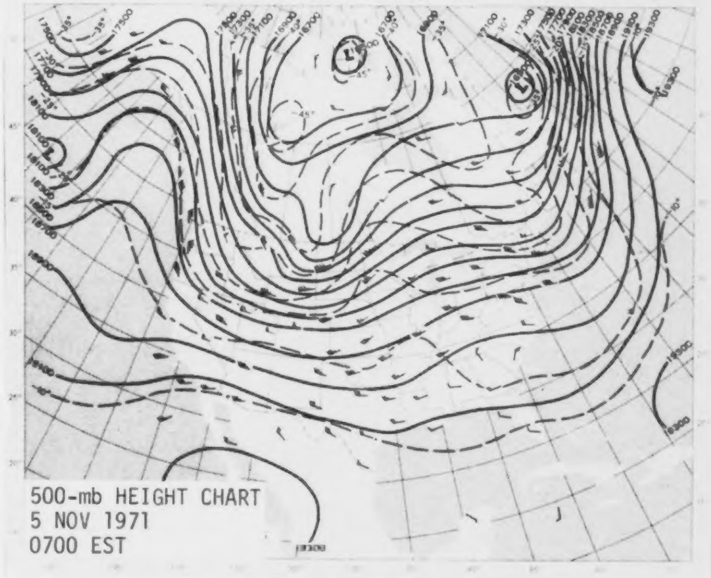
Regional - High centered over Maryland with ridges northward to Hudson Bay and southwestward to Texas Gulf coast; deep low over southern Manitoba. Surface wind light southeasterly. Long-wave 500-mb trough off Atlantic coast; near-zonal flow over northeastern U.S. Wind at 500 mb W 20 mps.

Local - Sunrise clear with ground fog in valleys. Stable with inversions to 1090 meters. Plume wind SW 3 mps. Noon clear. Lapse to 750 meters; stable with inversions above to 1220 meters. Plume wind SW 1 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
5 NOV 1971
0700 EST



500-mb HEIGHT CHART
5 NOV 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 6 November 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

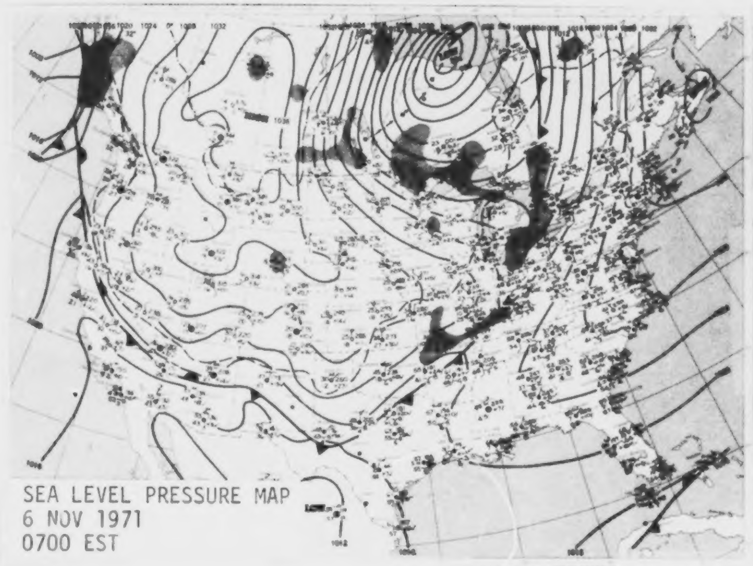
Three cross sections completed during first flight; bottoms of 10 and 16 km cross sections were at the surface. Additional 4 km cross section completed during second flight reveals slight plume shift. Good coverage of moderate-to-high wind, neutral GLC by helicopter and bubblers out to 30 km. SO_2 from Seward plume included in GLC measurements past 4 km.

Synoptic Situation

Regional - Closed high over Nova Scotia with ridge southwestward to Louisiana; deep low over Hudson Bay with cold front through Lake Huron to New Mexico. Surface wind light southerly. Eastern U.S. under leading edge of long-wave 500-mb trough; closed low over western Ontario. Wind at 500 mb SW 30 mps.

Local - Sunrise broken middle clouds. Stable with inversions to 700 meters; lapse above to 1100 meters. Plume wind SSW 8 mps. Noon middle scattered, high broken clouds. Near-neutral to 1110 meters. Plume wind SW 8 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


SEA LEVEL PRESSURE MAP
6 NOV 1971
0700 EST

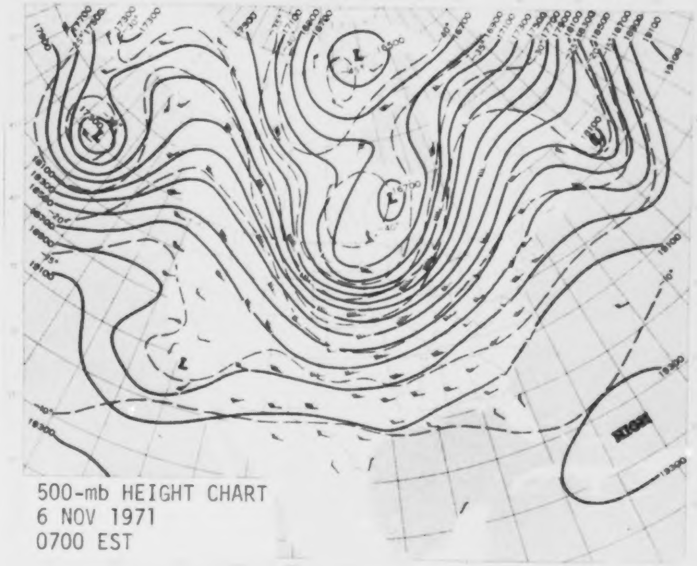

500-mb HEIGHT CHART
6 NOV 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 9 November 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

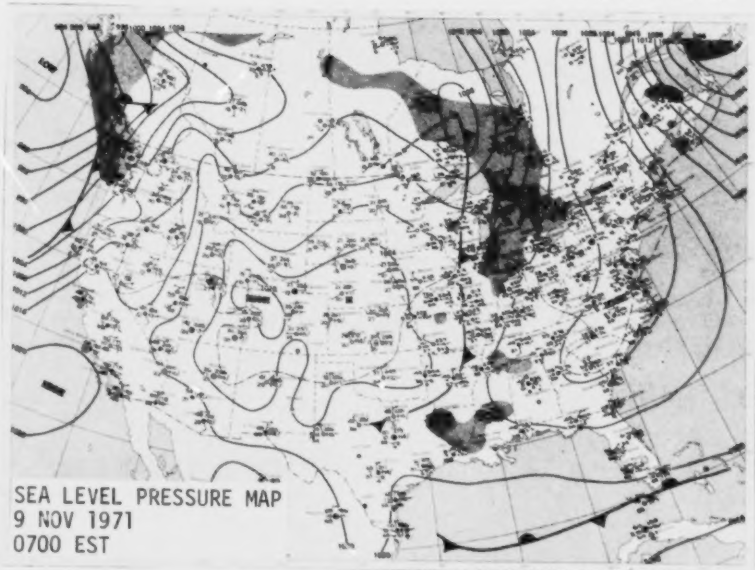
Three cross sections attempted during first flight; bottoms were at the surface. 16 km cross section incomplete because of low fuel supply. Additional 4 km cross section completed during second flight reveals plume shift and large vertical extent. Partial coverage of neutral GLC by helicopter and bubblers out to 20 km. SO_2 from Seward plume included in GLC measurements past 4 km. No afternoon flight attempted because of deteriorating weather conditions. AutoAnalyzer at airport office measured GLC from Conemaugh plume during midday.

Synoptic Situation

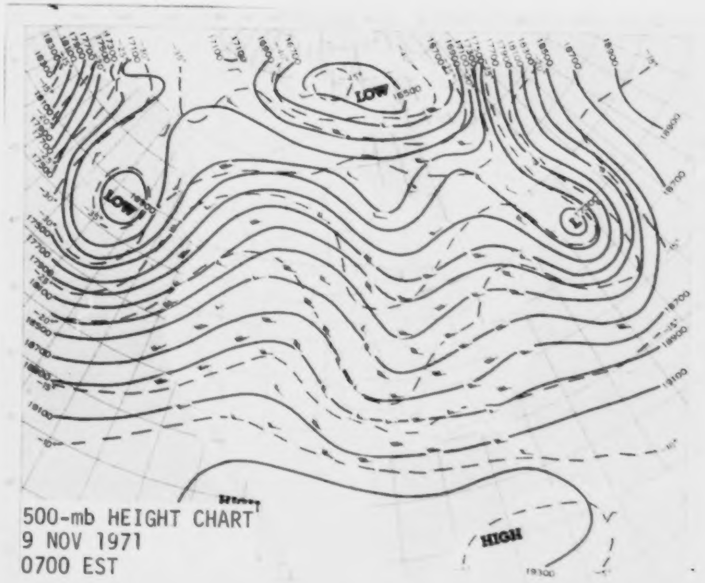
Regional - Ridge from central Quebec through Florida Gulf coast; closed low over Ontario with frontal trough through Illinois to Texas. Surface wind light northeasterly. 500-mb ridge from southern Atlantic coast to western Quebec; trough from Hudson Bay through Missouri to Texas. Wind at 500 mb W 20 mps.

Local - Sunrise broken middle clouds. Stable with inversions to 1070 meters. Plume wind SSE 8 mps. Noon middle scattered, high broken clouds. Near-neutral to 1050 meters. Plume wind WSW 4 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
9 NOV 1971
0700 EST



500-mb HEIGHT CHART
9 NOV 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 12 November 1971 Conemaugh Plume Unit 2

SO$_2$ Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC
Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

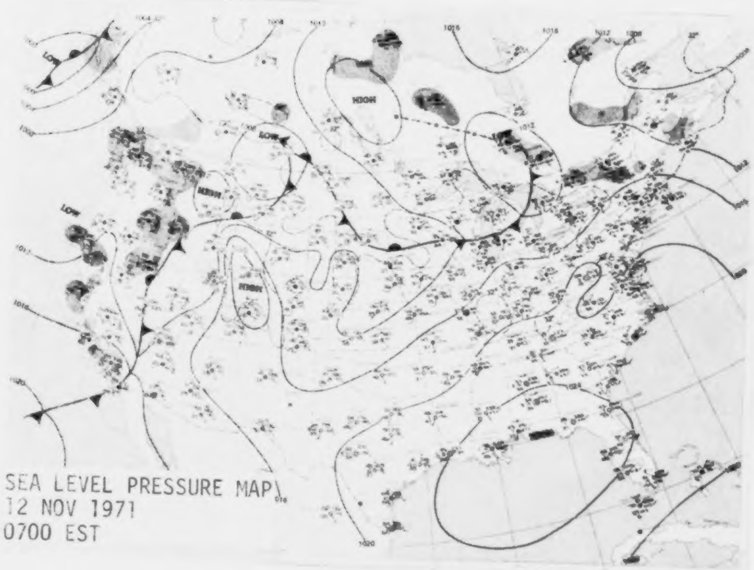
High SO$_2$ background aloft and at surface. Three cross sections completed; bottoms of 10 and 16 km cross sections were at the surface. Few high wind, neutral GLC measured by helicopter out to 16 km. Ground-level flights discontinued because of strong low-level turbulence and restricted visibility. Good coverage by bubblers of high wind, neutral GLC. AutoAnalyzer at airport office measured high background GLC during entire day. Plume heading diagonally across Laurel Ridge.

Synoptic Situation

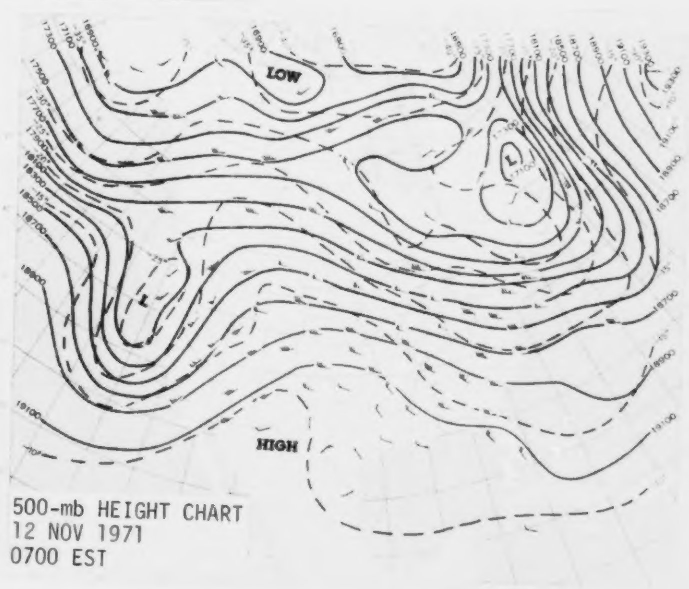
Regional - NE-SW ridge over eastern third U.S.; closed low over eastern Ontario. Surface wind SW 5 mps. Eastern U.S. under trailing edge of long-wave 500-mb trough; closed low over Labrador. Wind at 500 mb NW 23 mps.

Local - Sunrise scattered low clouds with fog. Stable with inversions to 1080 meters. Plume wind WSW 9 mps. Noon high scattered clouds with haze. Inversion layer 1000-1100 meters; near-neutral below and above to 1240 meters. Plume wind WSW 9 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY


LOW
HIGH
LOW
HIGH
LOW
HIGH

SEA LEVEL PRESSURE MAP
12 NOV 1971
0700 EST


LOW
L
L
HIGH
17300
17500
17700
17900
18100
18300
18500
18700
18900
19100

500-mb HEIGHT CHART
12 NOV 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 13 November 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC

On-stream AutoAnalyzer GLC
Helicopter Instantaneous GLC

Meteorological Measurements

Radiosonde
Helicopter Temperature Profiles

Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

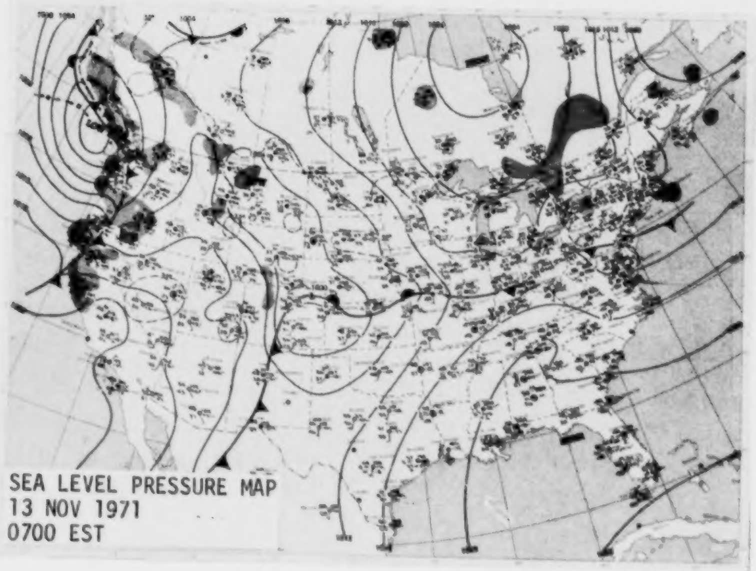
High SO_2 background aloft and at surface. Very wide plume. Only 4 and 10 km cross sections attempted. Tops of both incomplete because of low clouds; bottoms were at the surface. Few moderate wind, neutral GLC measured by helicopter out to 16 km. Ground-level flights discontinued because of strong low-level turbulence and restricted visibility. Bubblers were not set out. AutoAnalyzer at airport office measured high background GLC during morning. No afternoon radiosonde released. Plume heading across Laurel Ridge.

Synoptic Situation

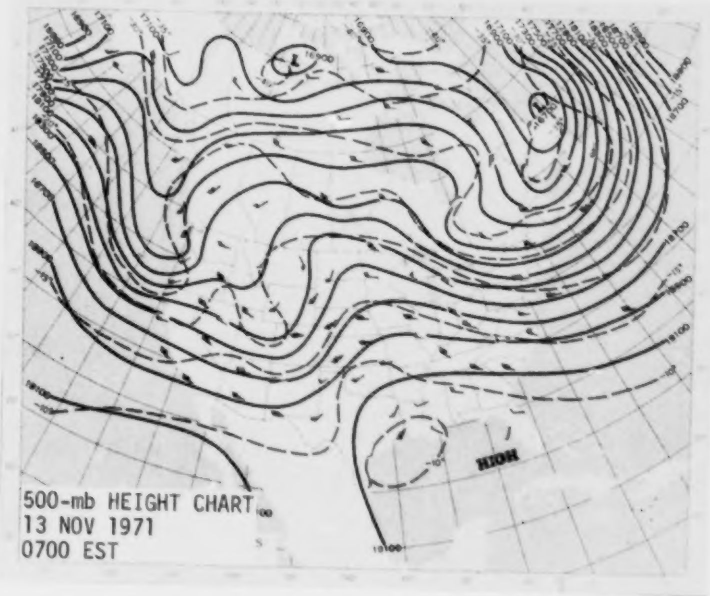
Regional - Cold front from New Jersey through Pittsburgh to western Illinois; N-S ridge from Hudson Bay to Florida Gulf coast. Surface wind light northwesterly. Eastern U.S. under trailing edge of long-wave 500-mb trough; NW-SE ridge over central U.S. Wind at 500 mb WNW 35 mps.

Local - Sunrise broken low clouds with fog and haze. Near-neutral to 995 meters: Plume wind W 6 mps. 1030 AM scattered low clouds with haze. Inversion layers 590-700 and 1050-1100 meters; lapse below, between, and above to 1250 meters. Plume wind W 5 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
13 NOV 1971
0700 EST



500-mb HEIGHT CHART
13 NOV 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 16 November 1971 Keystone Plume Unit 1

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
On-stream AutoAnalyzer GLC
Helicopter Instantaneous GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles
Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

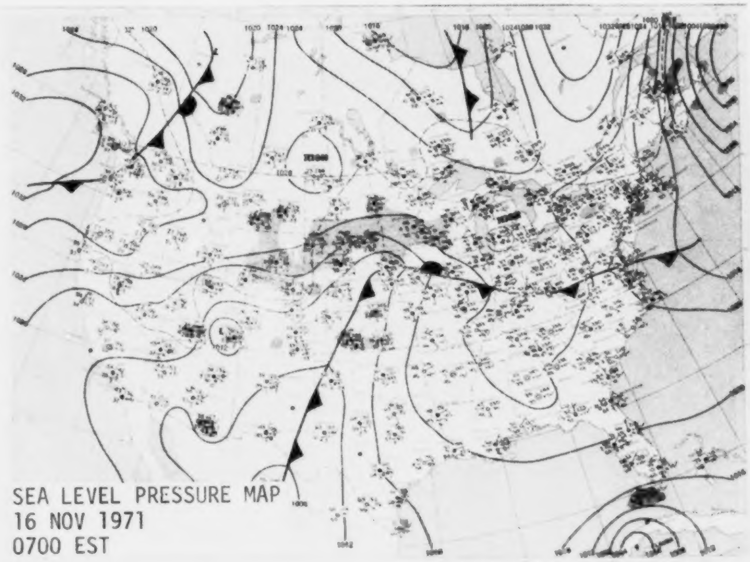
Helicopter takeoff delayed by fog. Three cross sections completed; bottom of 16 km cross section was at the surface. Nearly all zero GLC measured by helicopter during morning. Ground-level flights discontinued and bubblers were not set out because plume began to diffuse upward into overcast.

Synoptic Situation

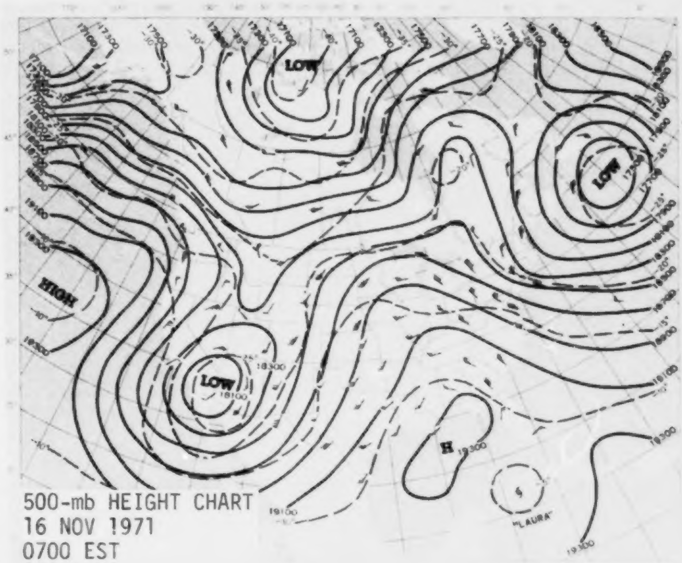
Regional - Weak N-S ridge over eastern third U.S.; cold front from western Illinois through Maryland coast. Tropical storm Laura over western Cuba. Surface wind light northwesterly. 500-mb high along Gulf coast with ridge northwestward through Minnesota; secondary NE-SW ridge over Quebec. Wind at 500 mb NNW 30 mps.

Local - 9 AM low overcast with fog. Stable layer 100-500 meters; near-neutral below and above to 1070 meters. Plume wind NNW 7 mps. 1230 PM low overcast. Slight inversion 550-565 meters; near-neutral below and above to 950 meters. Plume wind NW 3 mps.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP
16 NOV 1971
0700 EST


LOW
LOW
LOW
HIGH
H
"LAURA"

500-mb HEIGHT CHART
16 NOV 1971
0700 EST

Table 1. (continued) DAILY EXPERIMENT SUMMARY

October 1971 Series 17 November 1971 Conemaugh Plume Unit 2

SO_2 Measurements

Plume Cross Sections
Helicopter Peak GLC
Helicopter Instantaneous GLC

Portable Bubbler GLC
On-stream AutoAnalyzer GLC

Meteorological Measurements

Radiosondes
Helicopter Temperature Profiles

Pilot Balloons
Airport Surface Data

Other Participants

None

Commentary

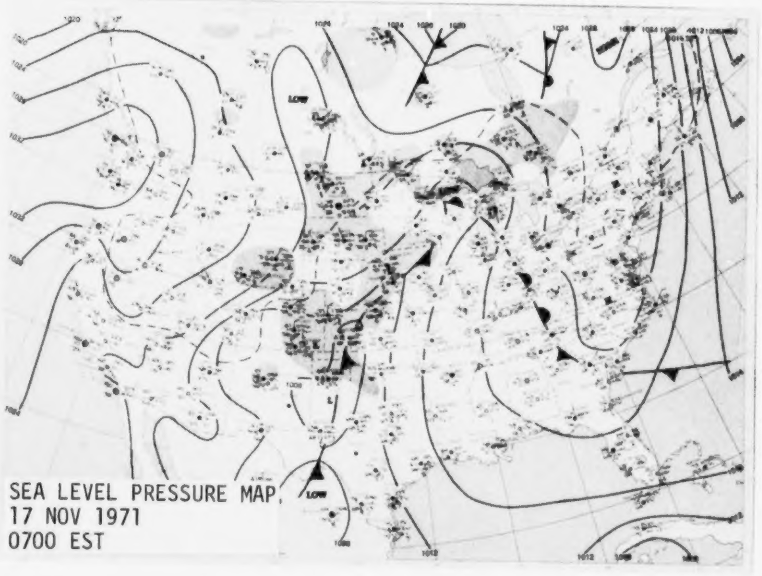
Extremely wide plume. During first flight, extremely wide 10 km cross section completed; bottom was at the surface. During second flight, 4 and 10 km cross sections completed; plume had narrowed considerably. Very high SO_2 concentrations in 4 km cross section. SO_2 from Seward plume included in GLC measurements near Conemaugh during early morning and within 10 km during remainder of sampling period. Excellent coverage of inversion breakup GLC and limited mixing layer GLC by helicopter out to 38 km during entire day; partial coverage by bubblers. Release of pilot balloons delayed by dense fog. Area under air stagnation advisory.

Synoptic Situation

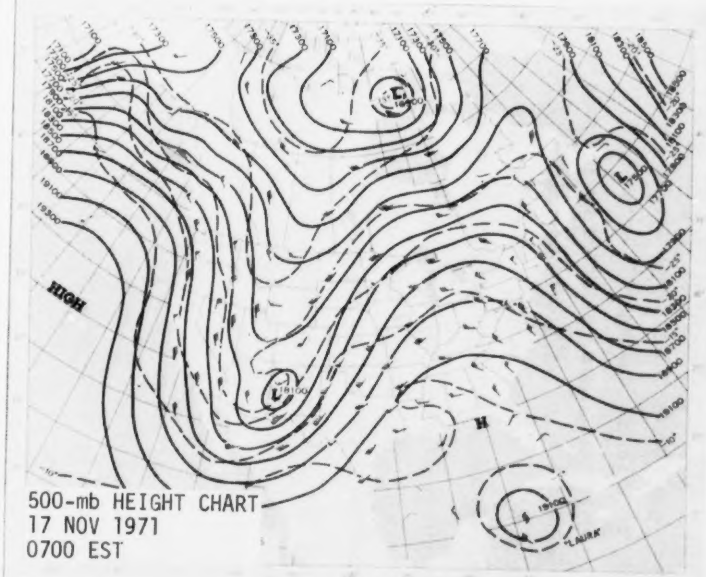
Regional - Ridge from eastern Quebec through Virginia to central Gulf coast; low over northern Wisconsin. Tropical storm Laura southwest of Cuba. Surface wind calm. NE-SW 500-mb ridge from Gulf coast through Labrador. Wind at 500 mb NW 18 mps.

Local - Sunrise scattered high clouds with ground fog in valleys. Stable with inversions to 1260 meters. Plume wind (from radiosonde) ESE 4 mps. 4 PM scattered high clouds. Stable with inversions 800-1100 meters; near-neutral below and lapse above to 1235 meters. Plume wind not available.

Table 1 (continued). DAILY EXPERIMENT SUMMARY



SEA LEVEL PRESSURE MAP,
17 NOV 1971
0700 EST


HIGH
L
L
L
H
LAURA

500-mb HEIGHT CHART
17 NOV 1971
0700 EST

SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

Table 2 presents hourly meteorological and SO_2 measurements obtained at Jimmy Stewart Airport for each day during 1971 on which flights were made by the LAPPES helicopter or on which data were collected by Brookhaven National Laboratory. Although experimental activities lasted less than 12 hours in most instances, values for the entire 24 hours are included. Daily resultant winds, precipitation totals, average and peak SO_2 concentrations, and total radiation are also presented.

For the majority of days, SO_2 concentrations are not available for a few hours during the afternoon. This loss of data occurred while the Technicon AutoAnalyzer was switched from on-stream monitoring to bubbler analysis.

In relating the surface meteorological measurements obtained at the airport to plume dispersion at the Conemaugh Generating Station, the topographical effect of Laurel Ridge, mentioned in Part 1 under Topography and General Climatology, must be considered. Airport measurements of temperature, relative humidity, precipitation, and total radiation will not be representative of conditions existing at Conemaugh under the mechanically-induced cloud cover. Similarly, surface wind directions and speeds in the proximity of Laurel Ridge may not be the same as those measured at the airport.

Table 2. SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

Legend

Time, EST : Hour designating preceding 60 minutes.
Dir, deg : Hourly average surface wind direction in whole degrees of azimuth.
Speed, mps : Hourly average surface wind speed in meters per second to nearest tenth.
Temp, °C : Hourly average temperature in degrees Centigrade to nearest tenth.
RH, % : Hourly average relative humidity in whole percent.
P, cm : Hourly total precipitation in centimeters to nearest hundredth.
SO_2, Avg : Hourly average SO_2 concentration in whole parts per hundred million by volume.
SO_2, Peak : Hourly peak SO_2 concentration in whole parts per hundred million by volume.
Ly/min : Total sun and sky radiation in Langleys per minute to nearest hundredth.
Day :

1. Daily resultant wind direction in whole degrees of azimuth and wind speed in meters per second to nearest tenth.
2. Daily total precipitation in centimeters to nearest hundredth.
3. Daily average SO_2 concentration in whole parts per hundred million. Daily average not computed if more than 6 hours' data were missing.
4. Daily peak SO_2 concentration in whole parts per hundred million. Daily peak not listed if more than 6 hours' data were missing.
5. Daily total sun and sky radiation in whole Langleys.

Var : Surface wind direction variable.
Calm : Surface wind speed less than threshold of aerovane sensor.
--- : Missing data.

Table 2. SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

21 April 1971

Time,	Dir,	Speed,	Temp,	RH,	P,	SO_2, pphm		Ly/
EST	deg	mps	°C	%	cm	Avg	Peak	min
0100	234	0.6	9.4	59		0	0	
0200	234	0.9	8.3	68		3	9	
0300	Var	0.4	6.6	75		8	23	
0400		Calm	5.5	81		8	8	
0500	Var	1.1	5.5	85		6	9	
0600	222	1.7	6.6	87		6	9	
0700	210	2.0	8.3	75		4	4	0.04
0800	223	2.3	8.8	67		2	3	0.15
0900	234	3.0	11.6	61		7	10	0.35
1000	237	3.3	11.1	59		9	11	0.17
1100	263	3.2	11.1	85		6	8	0.20
1200	269	5.2	11.6	69		3	6	0.34
1300	268	5.1	11.6	59		3	8	0.20
1400	269	5.5	10.0	63		3	5	0.12
1500	271	5.7	8.8	79		1	3	0.18
1600	269	5.4	8.3	91		-	-	0.21
1700	250	5.8	8.8	79		-	-	0.35
1800	263	5.5	8.8	73		-	-	0.30
1900	294	5.0	7.7	63		-	-	0.11
2000	317	4.6	6.1	70		0	0	
2100	312	4.8	6.1	70		0	0	
2200	314	4.2	5.0	75		0	0	
2300	303	3.5	4.4	81		0	1	
2400	290	4.2	3.8	85		2	4	
Day	272	3.0			0.00	4	23	163

22 April 1971

Time,	Dir,	Speed,	Temp,	RH,	P,	SO_2, pphm		Ly/
EST	deg	mps	°C	%	cm	Avg	Peak	min
0100	272	3.6	3.3	88		0	0	
0200	268	4.8	2.7	93		0	0	
0300	267	4.0	1.6	100		0	0	
0400	264	4.2	1.6	100		0	0	
0500	262	4.9	1.6	100		0	0	
0600	259	4.6	1.6	100		0	0	
0700	265	4.9	2.2	100		1	1	0.05
0800	267	5.3	2.7	100		1	1	0.08
0900	269	5.8	2.8	100		1	1	0.09
1000	277	5.8	3.8	93		0	0	0.12
1100	281	6.6	5.0	91		0	0	0.21
1200	274	7.0	5.0	91		0	0	0.26
1300	267	7.6	5.0	93		0	1	0.17
1400	272	7.7	5.0	91		0	0	0.15
1500	282	7.7	5.5	87		0	0	0.25
1600	280	7.0	6.6	79		0	0	0.30
1700	274	7.6	7.2	67		0	0	0.47
1800	266	7.5	7.7	59		1	1	0.27
1900	290	6.6	6.6	42		0	0	0.13
2000	281	6.5	3.8	43		0	0	
2100	273	5.1	3.8	45		0	0	
2200	284	4.8	2.7	44		0	0	
2300	285	5.1	1.6	53		0	0	
2400	282	4.2	0.5	61		0	0	
Day	274	5.8			0.00	0	1	153

23 April 1971

Time,	Dir,	Speed,	Temp,	RH,	P,	SO_2, pphm		Ly/
EST	deg	mps	°C	%	cm	Avg	Peak	min
0100	267	3.1	- 0.5	71		0	0	
0200	269	0.8	- 1.6	78		1	2	
0300	235	0.8	- 2.2	83		1	2	
0400	245	1.7	- 2.2	87		2	3	
0500	Var	2.1	- 2.7	95		4	5	
0600	254	0.9	- 2.7	100		5	8	
0700	246	0.9	1.1	100		7	8	0.24
0800	233	2.5	4.4	69		9	11	0.46
0900	264	4.4	7.7	51		6	10	0.76
1000	269	5.5	9.4	47		2	3	1.00
1100	284	6.1	11.1	43		1	1	1.19
1200	269	5.7	11.6	39		0	1	1.29
1300	295	5.0	12.7	37		1	1	1.30
1400	296	5.1	13.3	33		1	1	1.22
1500	295	5.1	13.3	33		1	1	1.11
1600	294	5.3	12.7	33		-	-	0.78
1700	285	5.1	11.6	33		-	-	0.47
1800	284	4.6	10.5	33		-	-	0.23
1900	292	3.0	8.8	33		-	-	0.11
2000	269	2.3	5.0	36		0	0	
2100		Calm	3.3	50		1	1	
2200	323	2.2	5.5	45		1	1	
2300	Var	0.9	1.6	57		2	4	
2400	090	1.2	0.0	69		2	4	
Day	280	2.7			0.00	2	11	610

24 April 1971

Time,	Dir,	Speed,	Temp,	RH,	P,	SO_2, pphm		Ly/
EST	deg	mps	°C	%	cm	Avg	Peak	min
0100	094	0.7	- 1.1	81		4	5	
0200		Calm	- 1.6	85		4	4	
0300	Var	0.8	- 1.6	90		3	7	
0400	182	0.4	- 1.6	90		6	9	
0500	214	2.2	0.5	77		7	10	
0600	226	2.1	2.2	69		9	10	
0700	205	4.6	5.5	61		7	9	0.09
0800	204	6.5	6.6	59		5	6	0.15
0900	220	6.9	7.7	50		3	4	0.22
1000	277	9.1	5.5	65		2	4	0.22
1100	262	7.4	7.2	69		1	1	0.34
1200	261	8.2	8.8	52		-	-	1.11
1300	272	9.0	6.6	43		1	1	----
1400	282	10.1	5.5	43		0	0	0.39
1500	282	11.2	5.5	43		0	2	0.73
1600	279	10.2	5.0	44		1	2	0.32
1700	269	11.1	4.4	51		0	1	----
1800	272	10.0	2.7	64		0	0	----
1900	276	7.7	2.7	75		0	0	
2000	276	6.0	2.7	95		1	1	
2100	280	5.5	2.2	85		1	1	
2200	262	3.7	0.5	100		1	2	
2300	249	3.0	- 0.5	100		2	3	
2400	251	1.2	- 1.6	100		2	2	
Day	264	5.1			0.00	3	10	----

Table 2. (continued) SURFACE WEATHER AND SO$_2$ OBSERVATIONS AT JIMMY STEWART AIRPORT

26 April 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO$_2$, pphm		Ly/min
						Avg	Peak	
0100		Calm	3.8	100		1	1	
0200		Calm	3.8	100		1	1	
0300	219	1.2	3.8	100		1	1	
0400	218	2.3	3.8	100		2	2	
0500	219	3.3	3.8	100		3	4	
0600	234	3.6	3.8	100		3	4	
0700	239	3.4	5.0	100		5	6	0.02
0800	275	3.9	6.1	89		4	6	0.09
0900	279	5.1	---	--		2	3	0.10
1000	287	5.0	---	--		0	0	0.15
1100	284	4.6	4.4	100		1	1	0.17
1200	282	5.6	3.8	100		3	5	0.20
1300	295	5.7	5.0	93	0.08	1	1	0.20
1400	292	6.6	5.5	73		1	1	0.45
1500	304	5.7	5.5	70		-	-	0.39
1600	302	5.7	4.4	75		-	-	0.22
1700	302	5.7	4.4	76		-	-	0.15
1800	302	5.2	3.8	81		-	-	0.09
1900	297	4.9	3.3	91		3	4	0.02
2000	305	2.5	3.3	93		5	5	
2100	294	2.7	2.7	96		3	4	
2200	278	3.4	3.3	27		3	3	
2300	324	3.1	3.3	89		3	4	
2400	339	3.0	2.7	90		2	3	
Day	286	3.4			0.08	2	6	135

28 April 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO$_2$, pphm		Ly/min
						Avg	Peak	
0100	140	5.9	9.4	50		0	1	
0200	129	5.4	7.7	87		1	1	
0300	116	4.4	7.7	87		1	1	
0400	132	6.2	7.7	89		1	1	
0500	134	4.4	7.7	93		0	0	
0600	133	4.7	7.7	100		0	1	
0700	143	6.0	8.3	98		1	2	
0800	147	5.7	8.3	100		2	2	0.06
0900	157	4.2	8.8	100		1	1	0.05
1000	177	2.7	11.6	100		1	1	0.05
1100	210	4.0	12.7	100		1	1	0.33
1200	236	5.8	15.5	69		2	2	0.80
1300	242	7.5	16.1	53		-	-	0.79
1400	242	8.6	17.7	41		-	-	0.94
1500	247	8.8	18.3	37		-	-	1.00
1600	236	9.5	17.2	36		-	-	0.61
1700	244	9.6	16.6	35		0	0	0.25
1800	245	8.8	15.5	35		0	1	0.15
1900	279	8.1	11.1	69		0	0	0.03
2000	284	6.3	10.5	59		0	0	
2100	275	7.6	8.8	59		0	0	
2200	269	4.6	8.3	65		0	0	
2300	265	5.1	8.3	67		0	0	
2400	264	7.6	7.7	66		0	0	
Day	223	3.7			0.00	1	2	304

29 April 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO$_2$, pphm		Ly/min
						Avg	Peak	
0100	262	5.5	7.2	71		0	0	
0200	263	5.5	6.6	73		0	0	
0300	261	5.9	6.1	85		0	0	
0400	263	5.9	5.0	100		1	1	
0500	250	5.3	5.0	97		1	1	
0600	257	6.1	5.0	95		1	2	
0700	254	5.3	4.4	97		1	2	
0800	261	6.4	4.4	95		0	0	0.05
0900	259	6.2	4.4	100		0	0	0.09
1000	257	6.8	5.0	100		1	1	0.26
1100	263	7.1	5.5	94		1	1	0.25
1200	274	6.9	5.5	89		0	0	0.18
1300	274	6.2	6.1	85		0	0	0.14
1400	268	6.2	6.1	84		0	0	0.14
1500	267	6.7	6.1	83		-	-	0.13
1600	140	5.9	5.5	88		-	-	0.08
1700	259	4.8	5.5	93		-	-	0.05
1800	272	4.5	5.0	100		-	-	0.04
1900	274	3.3	5.0	100		0	0	0.03
2000	277	2.2	5.0	100		1	1	
2100	267	2.0	5.0	100		1	1	
2200	267	3.1	5.0	100		1	1	
2300	273	2.7	5.0	100		2	2	
2400	267	3.4	5.0	97		2	2	
Day	261	4.8			0.00	1	2	86

4 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO$_2$, pphm		Ly/min
						Avg	Peak	
0100	271	3.2	2.2	81		0	0	
0200	279	3.2	1.1	89		0	0	
0300	278	3.4	1.1	94		0	0	
0400	273	2.9	0.0	100		0	0	
0500	240	2.3	- 0.5	100		1	2	
0600	235	3.0	0.0	100		2	2	
0700	233	2.7	1.1	91		2	3	0.21
0800	268	4.1	4.4	80		2	2	0.48
0900	259	5.9	7.7	67		2	4	0.75
1000	276	6.3	8.8	53		3	8	0.98
1100	289	7.0	10.0	45		0	1	1.19
1200	287	7.5	11.1	40		0	0	0.86
1300	277	7.8	12.2	39		0	1	1.08
1400	279	7.8	12.7	37		1	2	1.07
1500	280	9.1	13.3	35		-	-	0.74
1600	268	9.7	13.3	33		-	-	0.85
1700	275	9.1	13.3	33		-	-	0.60
1800	274	8.8	12.2	33		-	-	0.31
1900	282	7.4	11.1	33		-	-	
2000	286	5.1	10.0	32		-	-	
2100	278	3.3	8.8	35		-	-	
2200	263	1.8	7.2	39		-	-	
2300	235	0.9	6.6	43		-	-	
2400	269	4.0	8.8	43		2	2	
Day	274	5.1			0.00	-	-	547

Table 2. (continued) SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

5 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	276	3.5	7.7	47		0	1	
0200	275	3.2	7.7	51		1	3	
0300	Var	1.7	5.5	63		0	0	
0400	231	2.3	6.1	66		3	8	
0500	216	2.1	6.6	68		2	4	
0600	213	2.4	7.2	71		2	2	
0700	216	2.7	8.8	63		2	2	0.05
0800	204	5.2	12.7	53		4	5	0.30
0900	216	6.5	15.5	45		4	8	0.76
1000	235	6.1	16.6	43		2	3	0.92
1100	240	5.9	17.7	42		1	1	0.86
1200	222	6.9	20.0	38		1	1	1.47
1300	243	8.2	18.3	39		1	1	0.89
1400	244	7.6	17.7	40		-	-	0.37
1500	237	6.7	17.2	41		-	-	0.15
1600	229	6.3	15.5	43		-	-	0.05
1700	222	5.7	13.3	59		-	-	
1800	208	6.7	10.5	100		2	4	
1900	214	3.9	10.0	100	0.08	0	0	
2000		Calm	10.0	100	0.05	0	0	
2100	079	1.3	10.0	100		0	0	
2200	094	0.6	10.0	100	0.15	0	0	
2300	055	0.9	10.0	100	0.10	0	0	
2400	108	0.3	10.0	100	0.13	0	0	
Day	229	3.5			0.51	1	8	349

7 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	084	0.9	5.0	100		0	0	
0200	074	0.8	4.4	100		0	0	
0300	076	0.8	3.3	100		0	0	
0400	060	0.9	2.7	100		0	0	
0500	074	1.7	2.2	100		0	0	
0600	060	1.3	3.3	100		0	1	0.06
0700	046	0.9	7.7	100		0	0	0.21
0800	082	1.8	8.8	89		0	0	0.43
0900	077	3.4	13.3	63		0	0	0.62
1000	086	3.8	14.9	53		0	0	0.77
1100	095	3.3	16.1	50		0	0	1.02
1200	094	2.9	17.2	43		0	0	0.94
1300	150	2.5	18.3	40		0	0	0.96
1400	150	2.3	19.4	40		0	0	0.99
1500	137	3.5	18.8	40		-	-	0.84
1600	116	3.7	18.3	39		-	-	0.45
1700	114	3.6	17.7	41		-	-	0.20
1800	133	4.2	15.5	46		-	-	0.02
1900	147	5.2	12.2	51		0	0	
2000	119	3.4	10.5	93	0.05	0	0	
2100	102	3.4	10.0	100	0.08	0	0	
2200	108	3.9	10.0	100	0.08	0	0	
2300	115	4.9	10.0	100	0.41	0	0	
2400	113	5.1	10.5	100	0.10	0	0	
Day	110	2.6			0.71	0	1	451

10 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	Var	1.1	7.2	75		0	0	
0200	117	0.6	5.5	82		0	1	
0300		Calm	4.4	100		0	0	
0400	117	0.8	3.8	100		0	0	
0500	103	0.7	2.7	100		0	0	
0600	052	0.5	3.3	100		0	1	0.05
0700		Calm	7.7	100		0	0	0.23
0800	Var	0.8	11.1	77		0	0	0.51
0900	219	1.2	13.8	67		0	1	0.77
1000	254	1.3	16.6	55		0	0	0.99
1100	360	2.2	18.3	50		0	0	1.18
1200	352	3.2	18.8	44		0	0	1.29
1300	359	3.6	19.4	41		0	0	1.12
1400	023	3.0	20.0	38		-	-	0.86
1500	Var	2.7	20.0	35		-	-	0.30
1600	011	2.2	19.4	35		-	-	0.36
1700	289	1.3	20.0	35		-	-	0.36
1800	347	1.3	20.5	33		-	-	0.24
1900	343	1.4	17.7	33		0	0	0.05
2000		Calm	13.3	50		0	0	
2100	086	0.5	11.1	61		0	0	
2200	097	1.1	10.0	70		0	0	
2300	086	0.7	8.3	79		0	0	
2400	088	0.8	7.2	90		0	0	
Day	011	0.6			0.00	0	1	499

11 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	087	1.0	6.1	98		0	0	
0200	081	1.3	5.5	100		0	0	
0300	076	1.5	5.5	100		0	0	
0400	098	0.9	5.0	100		0	0	
0500	070	0.9	4.4	100		0	0	
0600	067	0.7	5.5	100		0	0	0.06
0700		Calm	10.0	91		0	1	0.15
0800	Var	0.8	16.6	47		0	0	0.49
0900	148	3.7	15.5	38		0	0	0.74
1000	155	3.5	20.5	35		0	0	0.97
1100	156	4.3	21.6	32		1	2	1.11
1200	169	3.9	22.7	31		1	2	0.92
1300	165	4.3	22.7	31		1	2	0.98
1400	164	3.1	23.3	29		1	2	0.92
1500	242	4.4	23.8	30		-	-	0.78
1600	254	3.0	23.8	29		-	-	0.82
1700	224	3.8	23.3	31		-	-	0.39
1800	243	4.2	21.6	31		-	-	0.20
1900	252	1.1	19.4	40		1	1	
2000		Calm	17.7	55		1	1	
2100	091	0.3	16.6	59		1	1	
2200	065	0.7	16.1	64		1	1	
2300	095	0.3	15.5	69		1	1	
2400	211	2.2	15.5	67		3	5	
Day	180	1.2			0.00	1	5	512

Table 2. (continued) SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

14 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/min
0100	216	2.5	3.8	100		3	4	
0200	216	2.8	3.8	100		2	2	
0300	220	3.7	3.8	100		3	4	
0400	218	3.2	3.8	100		5	6	
0500	216	3.5	3.8	100		8	10	
0600	219	3.3	4.4	100		9	10	
0700	224	3.0	6.1	100		9	10	0.23
0800	224	3.1	7.7	85		6	8	0.41
0900	223	4.6	10.5	79		6	6	0.58
1000	237	3.8	11.6	66		6	8	0.85
1100	240	4.0	13.8	63		5	10	1.08
1200	282	4.1	14.9	59		9	13	1.11
1300	272	4.4	16.1	53		12	17	1.26
1400	288	4.2	16.6	50		6	7	1.21
1500	287	4.5	17.7	47		6	8	1.14
1600	276	5.4	18.3	43		3	6	0.90
1700	268	5.3	18.3	41		1	3	0.66
1800	293	4.0	17.2	40		0	2	0.44
1900	299	3.0	16.1	36		0	0	0.16
2000	294	4.1	13.3	36		0	1	
2100	360	1.8	11.1	41		0	0	
2200	085	0.8	7.7	60		0	0	
2300	084	1.0	6.6	71		0	0	
2400	086	1.7	5.5	77		0	0	
Day	255	2.6			0.00	4	17	602

15 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/min
0100	090	0.9	5.0	87		0	0	
0200	096	1.1	5.0	83		0	0	
0300	080	1.1	5.5	67		0	0	
0400	044	0.6	6.6	63		0	1	
0500	062	0.5	5.5	69		1	1	
0600	045	0.6	7.2	77		1	2	
0700	056	0.8	11.6	57		2	2	----
0800	090	0.7	14.9	55		5	8	----
0900	149	2.1	17.2	47		9	11	----
1000	163	4.0	18.3	45		13	16	----
1100	162	3.6	18.8	44		9	13	----
1200	198	3.3	20.0	43		3	8	----
1300	187	3.1	21.1	41		1	1	----
1400	145	4.6	20.0	42		-	-	----
1500	150	4.4	20.5	42		-	-	0.89
1600	144	4.0	20.0	41		-	-	0.39
1700	158	3.4	20.0	41		-	-	0.20
1800	160	4.1	18.3	42		-	-	0.09
1900	150	4.5	17.2	45		1	2	
2000	148	6.0	16.1	50		2	2	
2100	158	5.9	16.1	57		1	1	
2200	172	4.7	15.5	56		2	3	
2300	175	4.1	14.9	59		2	3	
2400	173	4.7	14.4	63		3	5	
Day	155	2.7			0.00	3	16	----

17 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/min
0100	227	2.2	11.6	100		1	1	
0200	244	1.6	11.6	100		1	1	
0300	224	1.7	11.6	100		2	2	
0400	236	1.8	11.6	100		3	3	
0500	239	1.7	11.6	100		2	2	
0600	230	1.6	11.1	100		2	2	
0700	228	2.1	11.1	100		3	3	0.06
0800	228	3.7	13.3	100		4	6	0.34
0900	243	3.8	14.4	89		6	7	0.38
1000	240	2.7	16.6	69		4	4	1.04
1100	266	2.8	18.3	59		5	6	1.18
1200	289	4.4	20.0	43		2	5	1.29
1300	297	4.4	21.6	41		1	1	0.92
1400	297	4.5	22.2	33		0	1	1.28
1500	293	4.0	22.7	31		1	1	1.13
1600	306	5.2	22.7	31		0	1	0.95
1700	298	4.4	21.6	31		0	0	0.70
1800	284	5.2	21.1	31		0	0	0.42
1900	286	4.1	18.3	31		0	0	0.15
2000	277	2.2	14.4	35		0	0	
2100		Calm	11.6	43		0	0	
2200	077	0.8	10.5	63		0	0	
2300	081	1.0	10.0	71		0	0	
2400	090	1.2	8.3	83		0	0	
Day	272	2.2			0.00	2	7	590

19 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/min
0100		Calm	14.4	89		2	2	
0200	076	0.2	13.8	97		2	2	
0300		Calm	12.7	100		2	2	
0400	098	1.2	12.2	100		1	2	
0500	082	0.7	11.6	100		1	1	
0600	086	1.6	13.3	100		6	9	0.08
0700	077	0.8	18.8	79		9	10	0.29
0800	Var	0.8	23.3	55		4	6	0.57
0900	191	1.9	25.5	47		4	5	0.80
1000	220	5.2	26.1	48		6	8	0.99
1100	214	4.4	27.2	45		2	3	1.18
1200	226	4.1	28.3	41		1	2	1.26
1300	217	5.2	28.8	39		0	0	1.27
1400	222	4.5	28.8	39		-	-	1.21
1500	239	4.9	28.3	39		-	-	0.99
1600	237	4.6	27.7	39		-	-	0.66
1700	254	3.8	27.2	43		-	-	0.61
1800	249	3.3	26.6	43		1	1	0.37
1900	245	2.8	24.4	47		1	1	0.14
2000	216	1.4	21.6	59		1	1	
2100	077	0.7	21.1	69	0.05	1	1	
2200	Var	1.1	18.3	100		1	2	
2300	Var	0.8	18.3	93		1	2	
2400	Var	0.6	16.6	100		2	3	
Day	224	1.7			0.05	2	10	625

Table 2. (continued) SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

20 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	094	1.2	16.1	100		1	1	
0200	089	1.1	16.6	100		0	1	
0300	090	0.5	14.9	100		1	2	
0400	Var	1.5	14.4	100		2	3	
0500	Var	0.8	13.3	100		2	2	
0600	249	0.8	14.4	100		1	2	0.08
0700		Calm	16.1	100		1	1	0.22
0800	209	0.8	17.7	91		1	2	0.34
0900	248	1.0	20.0	79		0	1	0.59
1000	242	1.7	22.2	69		0	0	0.86
1100	239	2.6	22.2	65		1	4	0.96
1200	267	3.1	23.3	63		3	5	0.88
1300	251	3.7	23.8	55		1	1	1.29
1400	286	4.8	22.2	55		3	5	0.82
1500	288	5.0	22.7	55		-	-	0.60
1600	309	3.6	22.2	53		-	-	0.53
1700	317	3.0	22.2	53		-	-	0.41
1800	312	2.9	20.5	56		-	-	0.05
1900	308	2.9	19.4	59		2	2	
2000	297	3.8	17.7	55		1	2	
2100	Var	0.7	15.5	67		1	1	
2200	361	0.5	12.7	93		1	1	
2300	047	1.6	12.7	93		1	1	
2400	066	1.3	12.2	89		0	1	
Day	289	1.2			0.00	1	5	458

24 May 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	022	0.9	8.3	67		1	1	
0200	038	0.7	7.7	75		1	1	
0300	039	1.1	8.3	71		1	1	
0400	058	0.7	8.8	78		1	1	
0500	078	1.7	9.4	82		1	1	
0600	080	1.0	11.1	69		1	1	0.02
0700	081	1.4	18.8	79		1	1	0.06
0800	105	1.6	16.1	62		1	1	0.15
0900	132	2.1	17.2	63		2	2	0.21
1000	178	1.9	17.2	69		2	3	0.11
1100	205	4.0	20.0	69		3	5	0.11
1200	171	3.2	22.2	63		2	3	0.62
1300	223	5.0	21.1	65		4	9	0.44
1400	236	3.2	19.4	87	0.05	1	1	0.15
1500	167	3.5	21.1	89		2	3	0.19
1600	215	5.1	23.3	59		2	4	0.66
1700	215	5.3	23.8	53		6	9	0.40
1800	213	5.0	22.7	53		3	9	0.28
1900	200	3.0	21.1	57		3	8	0.06
2000	147	3.2	20.0	71		1	2	
2100	152	5.1	20.0	79		1	1	
2200	144	5.7	20.0	81		2	4	
2300	164	3.2	19.4	83		5	8	
2400	163	3.2	20.0	80		3	5	
Day	177	2.0			0.05	2	9	208

8 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	236	1.1	3.9	100		1	2	
0200	240	1.3	3.3	100		2	2	
0300		Calm	2.8	100		1	2	
0400	219	0.5	2.2	100		2	2	
0500		Calm	1.7	100	0.03	2	2	
0600	210	1.1	1.7	100		3	4	
0700	206	0.8	2.2	100		4	5	
0800		Calm	5.6	100	0.03	4	4	0.28
0900	196	3.4	7.8	79		4	5	0.50
1000	202	3.4	11.1	69		6	6	0.72
1100	220	2.8	12.2	59		7	10	0.93
1200	198	3.0	12.2	57		5	9	1.03
1300	214	3.4	13.3	55		4	9	0.93
1400	229	3.2	14.4	53		2	3	0.97
1500	231	2.6	15.0	52		2	3	0.80
1600	213	2.6	15.0	51		2	3	0.59
1700	186	2.4	13.9	51		3	6	0.27
1800	112	1.2	10.0	79		6	8	0.02
1900	151	2.7	10.0	79		7	9	
2000	198	1.9	10.0	77		3	5	
2100	159	2.2	10.6	71		2	3	
2200	158	1.6	10.6	73		1	2	
2300	145	1.5	10.6	70		4	6	
2400	131	1.3	10.6	71		3	4	
Day	197	1.6			0.05	3	10	422

10 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	264	2.7	11.7	100		1	2	
0200	240	2.8	10.6	100	0.08	2	3	
0300	241	2.0	10.6	100	0.03	3	4	
0400	270	2.8	9.4	100		2	2	
0500	291	2.1	9.4	100		2	3	
0600	283	2.9	8.9	100		3	3	
0700	289	2.0	8.3	100		3	3	
0800	271	1.5	8.3	100		1	2	
0900	276	2.4	9.4	100		1	3	0.05
1000	279	2.8	8.3	100		3	5	0.14
1100	280	2.8	9.4	100		3	4	0.28
1200	269	4.5	9.4	97		4	6	0.32
1300	257	4.9	9.4	91		3	4	0.32
1400	256	5.1	10.0	91		3	4	0.37
1500	256	5.0	9.4	89		2	4	0.27
1600	254	4.6	10.0	90		2	3	0.20
1700	264	3.3	9.4	89		1	1	0.10
1800	251	5.0	8.9	90		1	1	0.01
1900	249	2.8	8.3	97		2	3	
2000	257	3.7	8.3	98		2	3	
2100	228	3.1	8.3	100		3	3	
2200	229	3.8	7.8	100		3	3	
2300	228	3.4	6.7	100		3	3	
2400	228	3.4	5.6	100		3	3	
Day	257	3.1			0.10	2	6	124

Table 2. (continued) SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

12 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100		Calm	3.3	100		0	0	
0200		Calm	2.8	100		0	0	
0300		Calm	2.8	100		0	0	
0400	178	0.5	2.2	100		0	0	
0500	247	1.1	2.8	100		0	1	
0600	225	1.4	3.3	100		1	1	
0700		Calm	2.8	100		1	2	
0800	210	2.3	5.6	100		2	2	0.20
0900	217	2.4	7.2	100		4	5	0.44
1000	207	3.0	9.4	85		6	8	0.64
1100	218	2.2	11.1	75		7	11	0.72
1200	259	4.1	12.8	53		6	7	0.94
1300	245	4.7	13.9	52		2	3	1.08
1400	255	3.2	14.4	51		2	6	1.03
1500	248	4.0	13.9	51		2	4	0.78
1600	251	3.4	13.9	51		2	2	0.51
1700	261	2.5	12.2	51		3	3	0.25
1800	Var	0.7	8.3	73		3	3	
1900	083	1.3	5.6	95		3	3	
2000	077	1.6	4.4	98		2	2	
2100	072	1.3	3.9	100		2	2	
2200	067	1.2	3.3	100		2	2	
2300	078	1.3	3.3	100		1	1	
2400	081	1.7	3.3	100		1	1	
Day	233	1.0			0.00	2	11	395

13 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	071	1.7	3.9	100		2	2	
0200	075	2.1	4.4	95		2	2	
0300	068	1.0	4.4	93		2	2	
0400	060	1.0	5.6	89		2	2	
0500	051	1.0	5.6	89		2	2	
0600	130	4.0	8.3	73		2	2	
0700	130	4.6	8.9	71		1	2	
0800	136	4.7	11.1	66		1	1	0.20
0900	136	5.0	13.3	63		3	4	0.45
1000	130	4.7	15.6	59		6	9	0.64
1100	155	4.1	16.7	57		6	9	0.71
1200	149	4.3	17.8	57		5	6	0.82
1300	154	3.9	20.0	57		4	6	0.76
1400	186	5.1	20.6	59		0	1	0.64
1500	196	4.7	20.6	59		0	0	0.46
1600	171	3.5	19.4	59		0	0	0.25
1700	145	3.1	17.8	61		1	1	0.09
1800	134	4.0	16.7	65		1	1	
1900	133	4.2	15.6	71		2	3	
2000	144	3.4	15.0	75		3	3	
2100	148	3.4	15.0	79		3	3	
2200	147	4.3	15.6	79		6	8	
2300	149	2.9	15.0	83		7	7	
2400	136	3.8	14.4	86		4	7	
Day	143	3.2			0.00	3	9	301

14 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	151	2.0	14.4	87		3	3	
0200	156	1.8	14.4	87		1	2	
0300	250	3.4	13.3	91		2	3	
0400	217	1.3	11.7	100		3	3	
0500		Calm	10.0	100		2	2	
0600		Calm	10.0	100		2	2	
0700	Var	0.9	11.1	100		2	2	
0800	155	2.5	13.3	89		2	3	0.18
0900	218	2.3	15.0	79		2	3	0.35
1000	226	3.3	16.7	69		1	2	0.58
1100	226	3.4	16.7	66		1	1	0.69
1200	252	5.0	17.8	63		1	2	0.70
1300	244	4.3	17.8	57		2	2	0.99
1400	251	4.0	18.9	54		1	2	0.60
1500	248	3.5	18.3	53		1	2	0.66
1600	229	2.3	17.8	54		1	2	0.43
1700	219	2.1	16.7	59		1	1	0.27
1800	206	1.1	12.2	89		1	1	
1900	Var	0.5	10.0	100		1	1	
2000	084	0.8	8.9	100		1	1	
2100	090	1.2	8.3	100		1	1	
2200	084	1.3	7.8	100		1	1	
2300	081	0.9	7.2	100		1	1	
2400	084	1.0	6.7	100		1	1	
Day	222	1.3			0.00	1	3	327

15 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm		Ly/ min
						Avg	Peak	
0100	075	1.0	6.7	100		1	2	
0200	075	1.1	6.7	100		2	3	
0300	066	1.0	6.1	100		4	5	
0400	067	1.0	6.1	100		7	7	
0500	074	0.9	5.6	100		5	6	
0600	073	1.1	5.6	100		4	5	
0700	065	1.0	6.1	100		4	4	
0800	075	0.8	10.0	100		4	4	0.15
0900	113	0.5	14.4	89		4	6	0.38
1000	202	2.3	16.7	73		4	5	0.58
1100	199	2.8	19.4	67		5	6	0.82
1200	233	2.0	20.6	57		4	5	0.94
1300	203	2.2	21.7	51		2	3	0.95
1400	220	1.9	21.7	51		1	2	0.86
1500	214	1.6	21.1	51		1	1	0.55
1600	222	1.8	20.6	51		0	0	0.39
1700	236	0.6	17.8	69		1	1	0.13
1800	075	0.9	14.4	95		1	1	
1900	081	1.3	12.2	97		1	1	
2000	074	1.0	11.7	100		0	0	
2100	074	1.3	11.1	100		0	0	
2200	059	0.6	10.0	100		0	0	
2300	044	0.6	8.9	100		0	0	
2400	065	0.9	8.9	100		0	0	
Day	142	0.4			0.00	2	7	345

Table 2. (continued) SURFACE WEATHER AND SO$_2$ OBSERVATIONS AT JIMMY STEWART AIRPORT

18 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO$_2$, pphm		Ly/min
						Avg	Peak	
0100	081	1.5	10.0	100		0	0	
0200	071	1.2	9.4	100		0	0	
0300	068	2.3	9.4	100		0	0	
0400	070	1.9	8.9	100		0	0	
0500	094	1.5	8.9	100		0	0	
0600	085	2.3	8.3	100		0	0	
0700	087	1.8	8.9	100		0	0	
0800	086	3.0	10.0	89		0	0	0.19
0900	109	3.8	11.7	79		0	0	0.44
1000	129	4.0	13.3	66		0	0	0.69
1100	122	3.1	15.0	59		0	0	0.87
1200	089	2.0	16.7	51		0	0	0.96
1300	Var	1.6	17.8	48		0	0	0.94
1400	068	1.3	18.3	47		-	-	0.86
1500	069	2.9	18.3	47		-	-	0.74
1600	071	3.1	17.8	45		-	-	0.48
1700	071	3.0	16.7	47		-	-	0.20
1800	074	1.4	12.2	48		0	0	
1900	085	1.8	10.0	50		0	0	
2000	082	2.6	10.0	79		0	0	
2100	084	1.6	8.9	79		0	0	
2200	074	1.1	6.7	87		0	0	
2300	062	0.8	6.1	95		0	0	
2400	068	1.0	5.6	100		0	0	
Day	087	1.9			0.00	0	0	382

19 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO$_2$, pphm		Ly/min
						Avg	Peak	
0100	084	1.9	6.7	89		0	0	
0200	076	1.1	6.7	90		0	0	
0300	012	2.0	6.1	97		0	0	
0400	040	2.2	5.0	97		0	0	
0500	054	1.6	4.4	100		0	0	
0600	044	2.2	4.4	100		0	0	
0700	079	1.7	4.4	100		0	0	
0800	078	2.4	7.2	93		0	0	0.20
0900	055	2.3	11.1	69		0	0	0.44
1000	087	1.2	16.7	55		0	0	0.70
1100	084	1.5	20.0	42		0	0	0.88
1200	094	2.2	22 2	40		0	0	0.98
1300	099	2.4	23.3	38		0	0	0.96
1400	106	2.0	23.3	38		0	0	0.88
1500	096	3.3	23.3	38		-	-	0.72
1600	088	3.0	21.7	38		-	-	0.48
1700	082	2.5	18.9	39		-	-	0.22
1800	070	2.3	14.4	45		-	-	
1900	081	2.3	12.8	59		0	0	
2000	086	2.1	11.1	67		0	0	
2100	068	1.6	10.0	75		0	0	
2200	069	2.6	11.1	75		0	0	
2300	081	3.0	11.7	71		0	0	
2400	051	1.7	8.3	89		0	1	
Day	075	2.0			0.00	0	1	388

20 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO$_2$, pphm		Ly/min
						Avg	Peak	
0100	049	1.7	7.8	91		1	1	
0200	095	1.6	7.8	73		1	1	
0300	059	1.0	6.7	79		0	0	
0400	077	1.7	7.8	81		0	0	
0500	086	2.7	8.3	89		0	0	
0600	092	2.6	8.3	96		1	1	
0700	090	1.7	7.8	100		1	1	
0800	074	1.2	8.9	100		0	0	0.11
0900	109	3.4	12.8	81		0	0	0.42
1000	127	4.4	13.9	75		0	0	0.66
1100	134	4.2	15.6	67		0	0	0.85
1200	101	3.2	16.7	63		0	0	0.95
1300	109	3.0	20.0	59		0	0	0.93
1400	109	3.0	18.9	57		-	-	0.85
1500	124	3.4	18.9	55		-	-	0.67
1600	117	3.4	18.3	55		-	-	0.44
1700	107	3.0	16.7	57		-	-	0.18
1800	120	3.1	14.4	73		-	-	
1900	111	2.2	13.3	83		0	0	
2000	109	3.0	12.2	89		0	0	
2100	110	3.1	12.2	91		0	0	
2200	107	2.1	11.1	96		0	0	
2300	102	2.2	11.1	96		0	0	
2400	095	2.4	10.0	100		0	1	
Day	106	2.5			0.00	0	1	364

21 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO$_2$, pphm		Ly/min
						Avg	Peak	
0100	086	2.8	10.0	100		0	0	
0200	110	2.3	10.0	100		0	0	
0300	094	1.9	9.4	100		0	0	
0400	065	1.0	7.8	100		0	0	
0500	081	2.2	7.8	100		0	0	
0600	081	1.5	7.8	100		0	0	
0700	072	1.7	7.8	100		1	1	
0800	082	0.7	10.0	100		0	1	0.18
0900	088	1.5	13.3	81		0	1	0.43
1000	126	2.2	15.6	65		7	13	0.68
1100	144	1.5	18.9	57		4	5	0.84
1200	176	1.5	20.6	51		4	6	0.95
1300	129	2.2	21.1	50		2	3	0.95
1400	126	2.3	22.2	47		-	-	0.85
1500	152	2.1	22.8	46		-	-	0.70
1600	152	3.3	21.7	45		-	-	0.46
1700	149	3.1	18.9	45		0	0	0.21
1800	121	2.1	15.6	63		0	0	
1900	103	3.1	15.0	78		0	0	
2000	095	3.2	13.9	87		0	0	
2100	099	2.0	12.2	96		0	0	
2200	110	1.6	12.2	97		0	0	
2300	107	1.9	12.2	100		0	0	
2400	137	2.4	12.2	100		0	0	
Day	114	1.9			0.00	1	13	375

Table 2. (continued) SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

22 October 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/ min
0100	144	2.0	12.2	100		0	1	
0200	135	2.4	12.2	100		0	1	
0300	141	2.4	11.1	100		0	0	
0400	099	1.3	10.0	100		0	0	
0500	102	1.7	11.1	100		0	0	
0600	132	3.3	12.2	100		0	0	
0700	136	3.3	12.2	100		0	1	
0800	141	3.7	13.9	100		0	1	0.09
0900	159	3.6	15.0	89		2	3	0.31
1000	148	3.5	15.6	89		3	4	0.30
1100	161	3.1	17.2	79		4	4	0.49
1200	157	3.3	17.2	76		4	5	0.43
1300	157	2.7	17.2	76		2	4	0.22
1400	153	3.3	17.2	79		3	3	0.23
1500	164	2.4	17.8	79		-	-	0.23
1600	162	2.5	17.2	79		-	-	0.11
1700	147	2.6	15.6	97	0.03	-	-	0.03
1800	131	2.8	14.4	100		-	-	
1900	126	2.5	14.4	100	0.03	0	0	
2000	122	2.4	14.4	100	0.03	0	0	
2100	122	2.7	14.4	100		0	0	
2200	132	2.5	14.4	100		0	0	
2300	164	2.6	14.4	100		0	1	
2400	133	1.4	13.9	100		0	0	
Day	143	2.6			0.08	1	5	146

2 November 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/ min
0100	183	3.1	17.2	97	0.51	0	1	
0200	161	3.0	17.2	97	0.08	0	0	
0300	162	2.4	17.2	97	0.10	0	0	
0400	178	3.3	17.2	97	0.33	0	0	
0500	201	2.7	17.2	100	0.05	0	0	
0600	208	2.9	17.8	100	0.05	0	0	
0700	215	5.8	18.3	98	0.03	0	0	
0800	219	6.4	18.9	96		0	0	0.06
0900	220	6.4	20.0	87		0	0	0.09
1000	219	6.2	20.6	79		0	0	0.40
1100	228	6.5	21.1	69		0	0	0.25
1200	231	7.5	20.6	75		0	0	0.37
1300	232	7.8	20.0	81		0	0	0.13
1400	226	4.7	20.6	75		0	0	0.17
1500	224	5.8	20.0	83		0	0	0.28
1600	250	4.5	19.4	83		-	-	0.17
1700	238	2.9	16.7	91		-	-	0.10
1800	235	1.9	14.4	93		-	-	
1900	229	2.3	13.3	77		-	-	
2000	254	1.7	11.1	89		0	0	
2100	252	0.5	10.0	97	0.03	1	1	
2200		Calm	8.9	97		1	1	
2300	254	0.8	8.9	97	0.03	1	1	
2400	291	1.3	8.3	97	0.03	1	1	
Day	221	3.5			1.22	0	1	121

3 November 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/ min
0100	267	2.1	7.2	100		1	1	
0200	237	1.1	6.7	100		1	1	
0300	251	0.9	7.2	100		1	1	
0400	265	1.4	7.2	100		1	1	
0500	Var	0.7	6.7	100		1	1	
0600	Var	0.9	6.7	100		1	1	
0700	230	1.4	6.7	100		2	2	
0800	244	0.9	7.8	100		1	2	0.01
0900	220	2.2	8.3	95		1	2	0.10
1000	224	2.8	9.4	77		1	2	0.24
1100	244	3.9	11.1	59		3	4	0.34
1200	259	4.9	11.1	53		3	3	0.56
1300	258	5.5	11.1	53		3	5	0.50
1400	256	6.2	11.1	50		4	6	0.53
1500	264	6.2	8.9	79		3	11	0.33
1600	268	6.0	7.2	83		1	4	0.10
1700	234	3.0	6.7	53		-	-	0.09
1800	274	5.9	5.6	57		-	-	
1900	264	4.0	5.0	55		-	-	
2000	268	4.7	4.4	57		-	-	
2100	259	3.6	3.3	67		0	0	
2200	241	2.7	1.7	79		2	3	
2300	227	1.9	1.1	87		2	2	
2400	221	2.5	0.6	87		2	2	
Day	254	3.0			0.00	2	11	168

4 November 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/ min
0100	231	1.7	0.6	88		3	3	
0200	230	2.4	0.0	91		2	2	
0300	234	1.0	1.1	92		1	1	
0400	226	2.3	-0.6	100		1	1	
0500	232	1.7	0.0	79		1	2	
0600	235	1.7	1.1	66		2	3	
0700	248	3.5	1.1	68		2	4	
0800	262	7.1	2.2	65		1	1	
0900	255	6.0	3.3	61		0	1	0.21
1000	256	7.5	4.4	57		1	2	0.43
1100	260	7.4	4.4	55		1	1	0.59
1200	256	6.7	4.4	55		1	2	0.55
1300	261	5.6	5.6	51		2	3	0.49
1400	255	6.3	5.6	50		3	3	0.40
1500	261	5.7	5.6	48		3	3	0.22
1600	263	4.8	5.6	47		-	-	0.21
1700	259	5.1	5.0	47		-	-	0.12
1800	262	3.1	2.8	56		-	-	
1900	249	1.3	1.1	69		-	-	
2000	228	1.7	0.0	75		3	3	
2100	227	1.7	-0.6	81		1	1	
2200	199	0.9	-0.6	81		1	1	
2300		Calm	-1.1	87		1	2	
2400		Calm	-2.2	91		2	4	
Day	253	3.5			0.00	2	4	193

Table 2. (continued) SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRP

5 November 1971

Time,	Dir,	Speed,	Temp,	RH,	P,	SO_2, pphm		Ly/
EST	deg	mps	°C	%	cm	Avg	Peak	min
0100	243	0.5	- 2.2	94		3	4	
0200		Calm	- 2.8	95		4	5	
0300		Calm	- 2.8	97		3	3	
0400		Calm	- 3.3	98		4	4	
0500	090	0.9	- 3.3	98		3	4	
0600	087	0.7	- 3.3	98		3	3	
0700	100	1.0	- 3.3	97		2	3	
0800	085	0.2	1.1	69		3	3	0.15
0900	123	1.0	4.4	53		3	3	0.40
1000	166	1.9	6.7	48		4	5	0.54
1100	206	4.4	8.3	43		5	8	0.71
1200	208	3.8	10.0	39		5	8	0.82
1300	224	2.7	11.1	37		4	7	0.79
1400	168	2.4	11.7	35		2	4	0.72
1500	156	3.3	11.7	34		4	7	0.56
1600	162	2.9	11.7	33		-	-	0.33
1700	146	3.6	10.0	34		-	-	0.10
1800	131	3.3	8.9	35		-	-	
1900	119	2.3	7.2	35		-	-	
2000	131	4.1	7.8	35		0	0	
2100	134	5.0	7.2	35		1	1	
2200	148	6.3	7.2	35		0	0	
2300	169	4.2	6.7	35		1	2	
2400	159	3.8	6.1	36		2	2	
Day	157	2.1			0.00	3	8	307

6 November 1971

Time,	Dir,	Speed,	Temp,	RH,	P,	SO_2, pphm		Ly/
EST	deg	mps	°C	%	cm	Avg	Peak	min
0100	156	4.9	5.6	47		3	3	
0200	151	5.3	5.6	47		2	3	
0300	146	5.0	5.6	47		1	2	
0400	151	4.3	5.6	47		2	3	
0500	160	2.5	5.0	47		2	3	
0600	152	2.5	4.4	50		3	3	
0700	151	2.2	4.4	51		2	2	
0800	151	2.1	6.7	50		1	1	0.04
0900	152	2.0	7.8	46		2	2	0.13
1000	160	1.9	10.6	41		2	2	0.33
1100	212	5.1	12.2	39		3	5	0.40
1200	213	7.2	13.3	39		1	1	0.52
1300	216	7.6	15.0	39		2	3	0.64
1400	204	7.7	15.0	39		3	5	0.57
1500	216	7.4	13.9	39		2	3	0.29
1600	224	5.1	13.3	41		-	-	0.09
1700	224	2.0	11.7	50		-	-	
1800	249	1.9	11.7	50		-	-	
1900	213	1.6	10.6	51		-	-	
2000	Var	1.6	10.0	54		2	2	
2100	296	3.1	7.8	89		1	1	
2200	285	4.3	5.0	95		3	7	
2300	266	4.8	1.1	95		2	5	
2400	278	6.0	0.0	98		1	3	
Day	205	2.9			0.00	2	7	181

9 November 1971

Time,	Dir,	Speed,	Temp,	RH,	P,	SO_2, pphm		Ly/
EST	deg	mps	°C	%	cm	Avg	Peak	min
0100	076	0.6	- 7.2	93		1	1	
0200	089	0.7	- 7.8	93		1	2	
0300	081	1.4	- 7.8	93		1	1	
0400	084	0.9	- 7.8	93		2	3	
0500	102	0.9	- 5.6	94		2	3	
0600	096	1.3	- 4.4	93		4	4	
0700	092	1.6	- 3.9	89		3	3	
0800	Var	1.3	- 2.2	69		2	2	
0900	147	3.3	0.0	59		2	2	0.07
1000	162	3.1	2.2	50		3	4	0.35
1100	160	3.1	2.8	47		6	7	0.63
1200	176	2.8	3.9	41		4	6	0.39
1300	204	2.1	3.9	39		4	6	0.40
1400	217	2.3	4.4	39		4	4	0.19
1500	214	2.9	3.9	39		3	8	0.27
1600	244	2.6	3.3	39		-	-	0.06
1700	263	2.2	2.2	39		-	-	
1800	253	4.2	0.0	85		-	-	
1900	246	4.1	- 0.6	93	0.05	-	-	
2000	221	2.6	- 0.6	95	0.03	0	1	
2100	217	4.4	- 0.6	95		1	1	
2200	227	1.2	- 0.6	95		0	1	
2300	233	2.1	- 0.6	95		0	0	
2400	242	2.9	- 0.6	95		1	2	
Day	205	1.4			0.08	2	8	142

12 November 1971

Time,	Dir,	Speed,	Temp,	RH,	P,	SO_2, pphm		Ly/
EST	deg	mps	°C	%	cm	Avg	Peak	min
0100	229	1.4	1.7	95		3	3	
0200	229	2.4	1.1	95		3	3	
0300	223	2.6	1.1	95		4	4	
0400	219	2.6	1.1	95		4	5	
0500	216	2.5	1.7	97		4	4	
0600	222	2.9	1.7	97		4	4	
0700	219	2.9	2.2	97		4	4	
0800	223	3.5	3.9	85		4	4	0.07
0900	217	5.1	5.6	73		4	4	0.30
1000	222	5.1	8.3	62		3	4	0.50
1100	229	5.1	10.6	55		3	3	0.61
1200	239	6.8	10.6	55		2	3	0.63
1300	236	6.8	12.2	48		3	3	0.66
1400	234	5.7	12.8	47		3	3	0.54
1500	244	7.4	12.8	41		3	4	0.46
1600	240	5.2	11.7	41		3	4	0.07
1700	238	3.4	11.1	42		-	-	
1800	230	3.4	10.6	44		-	-	
1900	235	4.1	10.6	44		-	-	
2000	234	4.0	9.4	44		3	3	
2100	236	2.4	6.7	50		3	3	
2200	237	1.2	6.1	63		2	3	
2300	218	2.8	6.7	64		2	2	
2400	222	2.0	6.7	64		3	3	
Day	230	3.8			0.00	3	5	230

Table ontinued) SURFACE WEATHER AND SO_2 OBSERVATIONS AT JIMMY STEWART AIRPORT

13 November 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/min
0100	219	2.6	5.0	67		3	4	
0200	233	3.1	5.0	73		3	3	
0300	238	2.7	4.4	75		3	3	
0400	244	2.4	7.8	69		2	2	
0500	250	3.2	8.3	69		3	4	
0600	248	3.1	7.8	71		3	4	
0700	265	3.4	7.8	75		6	7	
0800	269	2.2	8.3	75		6	7	
0900	282	3.9	9.4	71		6	6	0.22
1000	278	2.8	10.0	62		6	6	0.40
1100	312	2.6	11.7	57		5	5	0.52
1200	299	3.4	12.2	53		5	6	0.66
1300	312	3.4	12.8	51		4	6	0.66
1400	314	3.1	12.8	50		2	2	0.59
1500	341	3.1	12.8	47		1	1	0.43
1600	327	2.6	12.2	45		0	1	0.26
1700	336	2.0	11.1	45		0	1	0.04
1800	Var	1.7	7.8	51		0	0	
1900	039	1.9	5.6	63		0	0	
2000	Var	0.7	3.9	77		1	3	
2100	066	0.8	1.1	89		0	0	
2200	093	0.6	1.1	92		1	1	
2300	062	0.7	0.0	93		0	0	
2400	059	0.5	0.0	94		0	0	
Day	285	1.5			0.00	3	7	227

16 November 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/min
0100	274	3.0	9.4	91		1	2	
0200	295	1.3	8.3	94		2	3	
0300	314	1.0	8.3	95		2	2	
0400	237	0.9	6.1	96		0	1	
0500	278	1.5	6.1	97		0	0	
0600	266	1.9	6.7	100		1	2	
0700	248	1.6	7.2	100		1	1	
0800	243	2.1	7.2	100		1	1	
0900	263	1.9	7.8	100		1	1	0.06
1000	264	2.1	8.9	93		2	2	0.16
1100	304	2.0	9.4	81		1	1	0.17
1200	311	2.0	10.0	75		1	1	0.21
1300	315	2.2	10.0	73		0	1	0.10
1400	318	2.1	10.6	69		0	0	0.14
1500	296	2.4	10.6	71		0	0	0.10
1600	283	2.5	10.0	75		0	0	0.02
1700	284	1.8	9.4	77		1	2	
1800	272	0.8	8.9	83		2	2	
1900	295	0.8	8.9	85		1	1	
2000		Calm	8.3	89		1	1	
2100		Calm	8.3	90		1	1	
2200		Calm	7.8	92		1	1	
2300		Calm	5.6	97		1	1	
2400		Calm	3.9	97		1	1	
Day	283	1.3			0.00	1	3	58

17 November 1971

Time, EST	Dir, deg	Speed, mps	Temp, °C	RH, %	P, cm	SO_2, pphm Avg	SO_2, pphm Peak	Ly/min
0100	076	1.0	3.9	100	0.03	0	1	
0200	076	0.9	3.3	100		0	0	
0300	075	0.5	2.8	100		0	1	
0400	076	0.9	1.7	100	0.03	0	1	
0500	089	0.6	1.7	100		0	0	
0600	089	0.9	1.1	100		0	0	
0700	Var	1.7	1.1	100		0	0	
0800	056	1.1	2.2	100		0	0	
0900	088	2.0	5.6	100		0	1	0.12
1000	090	1.1	10.0	71		1	1	0.31
1100	Var	1.0	12.8	53		1	1	0.55
1200	Var	0.8	14.4	50		2	4	0.62
1300	Var	1.0	16.1	47		1	1	0.63
1400	Var	1.9	16.1	43		2	6	0.55
1500	Var	1.2	16.7	43		3	6	0.43
1600	249	2.1	15.6	43		-	-	0.21
1700	236	1.2	13.3	50		-	-	
1800		Calm	10.0	63		-	-	
1900	082	0.8	7.8	79		-	-	
2000	081	0.9	6.7	89		-	-	
2100	078	0.9	5.0	93		2	3	
2200	081	1.2	4.4	95		2	2	
2300	075	1.0	3.9	97		1	2	
2400	077	1.0	3.3	97		1	2	
Day	084	0.5			0.05	1	6	205

PLUME CROSS SECTIONS

Cross sections of the Conemaugh and Keystone plumes obtained by the LAPPES helicopter are presented in Table 3. The orientation is such that the reader is looking downwind with the plume top to his right. The height of each traverse above the source generating station's stack base elevation is indicated over the particular column of data with increasing altitude from left to right. The relative order in which the traverses were flown is shown at the base of each column.

The plume can be physically located by means of radial directions listed in the second column for each data point. These were determined by computing clockwise and/or counterclockwise from the given reference point in increments based on the arc distance of the particular cross section. For the 4-, 10-, and 16-kilometer cross sections, the radial increments between each data point are 1.92°, 0.96°, and 0.48°, respectively. Because of missing coordinates, the reference point for cross section 408 was arbitrarily set at 360°; actual plume position may be derived from related measurements.

The first column of each cross section lists the cumulative distance across the plume beginning with zero at the left edge looking downwind. The corresponding SO_2 concentrations in pphm by volume are instantaneous readings taken at 6-second intervals; this corresponds to a crosswind distance increment of 134.1 meters (50 mph). The peak concentration in each traverse is shown at the bottom with the data point nearest the peak's location indicated by an asterisk in the column above. All instantaneous and peak SO_2 concentrations are net plume values, i.e., the ambient SO_2 and CO_2 backgrounds have been subtracted.

When the data are presented in this manner, the horizontal distance across the plume is scaled correctly whereas the vertical is not. To achieve a true physical reproduction of the plume, the distance between the columns would have to be scaled according to the respective traverse heights. Although completely zero traverses are shown as terminating at the plume edge, these flights were normally extended well beyond to confirm the absence of SO_2. Finally, crosswind and vertical integrated concentrations are listed at the bottom and side of each cross section.

Crosswind integrated concentrations (CIC) in grams per square meter for each plume traverse were calculated as follows:

$$CIC_j = 2.67 \times 10^{-6} \times \sum_i X_{ij}\, dy_i$$

where 2.67×10^{-6} = conversion factor from ppb to grams/m^3 based on a mean temperature aloft of 4°C and a mean altitude of 425 meters MSL.

X_{ij} = SO_2 concentration in ppb of the i-th data point in the j-th traverse.

dy_i = cross-plume interval at which readings were made (134.1 meters).

Vertical integrated concentrations (VIC) in grams per square meter for each data point were obtained from the properly aligned traverses by means of this equation:

$$VIC_i = 2.67 \times 10^{-6} \times \sum_j X_{ij}\, dz_j$$

where 2.67×10^{-6} = conversion factor defined above.

X_{ij} = SO_2 concentration in ppb of the i-th data point in the j-th traverse.

dz_j = one-half the difference between the next higher and the next lower pass for interior traverses. For the highest (lowest) traverse, dz_j is the height difference between the traverse and the next lower (higher).

The crosswind and vertical integrated concentrations were computed on the basis of ppb SO_2 during cross-section reduction and may differ slightly from the result obtained by using the SO_2 values rounded to pphm, as presented in Table 3.

Table 3. PLUME CROSS SECTIONS

Legend

Ref pt	: Direction of cross section reference point from Conemaugh or Keystone stacks in whole degrees of azimuth.
Cum y, m	: Cumulative distance across plume in whole meters.
Dir, deg	: Direction of each data point from Conemaugh or Keystone stacks in degrees of azimuth to nearest tenth.
Height, m	: Height of each traverse above Conemaugh or Keystone stack base elevation in whole meters.
VIC	: Vertical integrated concentration in grams per square meter x 10^{-3}.
CIC	: Crosswind integrated concentration in grams per square meter x 10^{-3}.
Peak	: Peak SO_2 concentration per traverse in whole parts per hundred million by volume.
Pass	: Numerical order in which traverses were flown.
*	: Designation of data point nearest peak concentration location in each traverse.

Table 3. PLUME CROSS SECTIONS

Conemaugh 374
21 April 1971
0706 to 0729 EST

Arc 4.0 km
Ref pt 073°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 350	373	405	437	485	550	635	670	710	VIC
0	073.0					0					0
134	074.9					21					31
268	076.8					*71					106
402	078.8					64					96
536	080.7	0		0		5					7
671	082.6	*1		*12		0					11
805	084.5	*1		17							15
939	086.4	0	0	0			0				0
1073	088.4		*1		0		71				143
1207	090.3		0		*44		232				512
1341	092.2				9		138				286
1475	094.1				0		127			0	254
1609	096.1						332	0		0	665
1743	098.0						*418	172	0	0	1113
1878	099.9						89	368	*141	0	907
2012	101.8						63	*548	56	0	1060
2146	103.7						0	279	0	0	447
2280	105.7							1		0	2
2414	107.6							0		0	0
CIC		7	4	104	190	577	5266	4900	706	0	
Peak		1	4	20	55	120	487	552	178	0	
Pass		9	8	7	6	1	2	3	4	5	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 375 Arc 10.0 km
21 April 1971 Ref pt 109
0737 to 0822 EST SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 320	350	440	486	568	615	687	705	727	768	VIC
0	077.5			0		0						0
134	078.3			1		2						5
268	079.0			2		4						10
402	079.8			2		4						10
536	080.6			3		5						14
671	081.3			4		7						19
805	082.1		0	4		6						18
939	082.9		2	5		6						23
1073	083.6	0	3	9	0	7						33
1207	084.4	5	3	9	1	6						37
1341	085.2	5	4	7	4	8						44
1475	085.9	8	3	10	4	10						53
1609	086.7	9	4	11	4	10						58
1743	087.5	10	7	13	10	13						82
1878	088.3	10	7	13	6	15						79
2012	089.0	12	9	12	20	30						131
2146	089.8	14	10	9	41	32						168
2280	090.6	16	11	9	31	55						194
2414	091.3	23	15	10	36	74						249
2548	092.1	16	20	11	*79	96						364
2682	092.9	*26	19	6	40	76						260
2816	093.6	16	16	10	30	114						303
2950	094.4	12	17	11	18	135						318
3085	095.2	11	17	14	68	*138						414
3219	095.9	2	*26	16	44	121						354
3353	096.7	3	17	13	12	90						228
3487	097.5	3	11	17	6	47						142
3621	098.2	1	7	*15	4	51						133
3755	099.0	1	5	3	3	12						40
3889	099.8	0	4	0	22	8						58
4023	100.5		17		5	32						90
4157	101.3		11		2	43						95
4292	102.1		7		2	55						109
4426	102.9		4		2	48					0	92
4560	103.6		2		2	2					0	10
4694	104.4		2		2	0					0	7
4828	105.2		1		3	6	0				0	17
4962	105.9		1		2	2	10			0	0	24
5096	106.7		0		2	0	5			1	0	12
5230	107.5				1		1			1	0	4
5364	108.2				1		0			2	0	3
5499	109.0				0		0		0	1	0	1
5633	109.8						0		5	1	0	3
5767	110.5						30	0	22	2	0	61
5901	111.3						31	4	37	2	0	75
6035	112.1						20	*12	5	18	0	64
6169	112.8						30	0	19	39	0	90
6303	113.6						27	0	*106	63	0	151
6437	114.4						106	1	38	23	0	208
6571	115.1						*141	0	9	10	0	235
6706	115.9						111		7	44	0	215
6840	116.7						29		5	55	0	94
6974	117.5						12		4	*79	0	86
7108	118.2						8		3	19	0	30
7242	119.0						6		3	8	0	18
7376	119.8						6		2	5	0	15
7510	120.5						6		5	4	0	15
7644	121.3						5		3	4	0	13
7778	122.1						6		1	3	0	12
7913	122.8						4		1	3	0	9
8047	123.6						4		0	3	0	9
8181	124.4						2			3	0	6
8315	125.1						3			2	0	6
8449	125.9						2			2	0	5
8583	126.7						1			1	0	2
8717	127.4						0			0	0	0
CIC		727	1010	892	1816	4908	2171	61	985	1426	0	
Peak		28	27	20	80	154	143	22	106	84	0	
Pass		10	9	8	7	6	1	2	3	5	4	

Conemaugh 376 Arc 16.0 km
21 April 1971 Ref pt 101°
0824 to 0836 EST SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 558	680	VIC
0	085.2	0		0
134	085.6	1		3
268	086.1	1		3
402	086.6	1		3
536	087.1	0		0
671	087.6	1		3
805	088.0	2		7
939	088.5	2		7
1073	089.0	2		7
1207	089.5	3		10
1341	090.0	3		10
1475	090.4	5	0	16
1609	090.9	2	1	10
1743	091.4	1	3	13
1878	091.9	2	2	13
2012	092.4	11	2	42
2146	092.8	13	3	52
2280	093.3	15	6	68
2414	093.8	22	17	108
2548	094.3	24	6	98
2682	094.8	22	8	98
2816	095.2	20	6	85
2950	095.7	19	4	75
3085	096.2	18	15	108
3219	096.7	11	20	101
3353	097.2	15	20	114
3487	097.6	16	21	121
3621	098.1	19	28	153
3755	098.6	14	19	108
3889	099.1	26	15	134
4023	099.6	*28	15	140
4157	100.0	23	21	143
4292	100.5	19	23	137
4426	101.0	23	*34	*86
4560	101.5	14	17	101
4694	102.0	20	16	117
4828	102.4	9	10	62
4962	102.9	8	6	46
5096	103.4	4	5	29
5230	103.9	5	1	20
5364	104.4	3	0	10
5499	104.8	0		0
5633	105.3	1		3
5767	105.8	0		0
CIC		1605	1211	
Peak		29	38	
Pass		1	2	

Conemaugh 377 Arc 4.0 km
22 April 1971 Ref Pt 105°
0703 to 0717 EST SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 174	253	305	383	435	VIC
0	081.9	0					0
134	083.9	1					2
268	085.8	4		0		0	8
402	087.7	12		2		7	39
536	089.6	8		3		14	42
671	091.6	15		12	0	62	139
805	093.5	12		*17	5	60	147
939	095.4	*15	0	2	4	*76	148
1073	097.3	5	3	0	6	58	107
1207	099.2	0	*5		12	31	73
1341	101.2		5		15	26	71
1475	103.1		5		8	15	43
1609	105.0		5		*22	[illegible]	64
1743	106.9		3		21	8	53
1878	108.8		0		5	0	9
2012	110.8				3		5
2146	112.7				3		5
2280	114.6				4		7
2414	116.5				3		5
2548	118.4				0		0
CIC		258	93	129	398	1322	
Peak		16	7	23	36	77	
Pass		5	4	3	1	2	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 378 Arc 10.0 km
22 April 1971 Ref pt 110°
0733 to 0751 EST SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 183	253	318	365	439	VIC
0	096.2					0	0
134	096.9					2	4
268	097.7					2	4
402	098.5			0		3	6
536	099.2			2		4	11
671	100.0	0		1		2	5
805	100.8	1		1		4	11
939	101.5	2		1		4	13
1073	102.3	1		2		3	11
1207	103.1	1		3		4	14
1341	103.9	2		5		4	19
1475	104.6	2		5		6	23
1609	105.4	3		12		7	37
1743	106.2	5		14		*8	46
1878	106.9	7	0	11	0	4	37
2012	107.7	*11	1	16	1	5	58
2146	108.5	11	1	17	2	6	63
2280	109.2	11	0	*18	7	7	73
2414	110.0	8	2	15	8	7	68
2548	110.8	4	2	12	8	4	50
2682	111.5	4	4	10	7	3	47
2816	112.3	1	7	7	8	5	48
2950	113.1	1	*7	5	*11	5	49
3085	113.8	0	7	3	8	3	36
3219	114.6		6	1	8	3	31
3353	115.4		7	0	6	1	24
3487	116.1		6		5	2	23
3621	116.9		5		3	1	16
3755	117.7		1		0	0	2
3889	118.5		1		1		3
4023	119.2		2		2		7
4157	120.0		1		5		10
4292	120.8		1		1		3
4426	121.5		1		0		2
4560	122.3		0				0
CIC		269	222	577	326	390	
Peak		13	9	20	13	10	
Pass		1	2	3	4	5	

Conemaugh 379 Arc 4.0 km
23 April 1971 Ref pt 105°
0718 to 0741 EST SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 436	461	475	559	637	684	747	805	884	VIC
0	083.9	0									0
134	085.8	5									3
268	087.7	1	0								1
402	089.6	2	7								5
536	091.6	*2	5								4
671	093.5	1	9								5
805	095.4	1	11								6
939	097.3	0	13								7
1073	099.2		11	0	0						6
1207	101.2		*14	4	26						69
1341	103.1		11	4	40						97
1475	105.0		8	5	54		0				127
1609	106.9		4	30	83		9				234
1743	108.8		0	31	199		30				515
1878	110.8			45	*235		4				573
2012	112.7			*50	190	0	25				513
2146	114.6			0	233	1	9				519
2280	116.5				58	1	8				139
2414	118.4				0	46	24				111
2548	120.4					51	*195	0	0		371
2682	122.3					231	165	*155	*151		1148
2816	124.2					*253	22	64	61		665
2950	126.1					38	0	20	24	0	139
3085	128.1					0		0	0	*20	42
3219	130.0									9	19
3353	131.9									0	0
CIC		43	333	605	4005	2225	1759	856	845	104	
Peak		8	17	76	250	276	212	161	173	51	
Pass		8	9	1	2	3	4	5	6	7	

Conemaugh 380 Arc 4.0 km
24 April 1971 Ref pt 048°
0659 to 0711 EST SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 305	364	431	496	558	618	677	VIC
0	028.8		0						0
134	030.7		9						15
268	032.6		32						54
402	034.6		53						89
536	036.5	0	*22	0					37
671	038.4	8	7	25					68
805	040.3	*12	0	50	0				107
939	042.2	5		135	70				364
1073	044.2	0		113	*504			0	1047
1207	046.1			131	295		0	0	727
1341	048.0			*190	5	0	*48	0	419
1475	049.9			98	0	224	5	0	546
1609	051.8			0		*273	40	0	508
1743	053.8					32	0	0	52
1878	055.7					0		0	0
CIC		90	441	2658	3131	1895	333	0	
Peak		15	63	192	516	276	72	0	
Pass		7	6	1	2	3	4	5	

Conemaugh 381 Arc 10.0 km
24 April 1971 Ref pt 048°
0717 to 0741 EST SO_2, pphm

Cum y, m	Dir, Deg	Traverse height, m 318	367	434	494	549	613	677	VIC
0	024.2	0							0
134	024.9	1							[illegible]
268	025.7	1							[illegible]
402	026.5	3							4
536	027.3	6	0						8
671	028.0	7	1						11
805	028.8	9	8						24
939	029.6	11	20	0					45
1073	030.3	13	11	3					39
1207	031.1	15	10	3					40
1341	031.9	*18	9	4					44
1475	032.6	16	*19	4					57
1609	033.4	11	10	5					38
1743	034.2	2	2	6					16
1878	034.9	1	2	16	0				31
2012	035.7	1	2	26	2				51
2146	036.5	0	3	14	4				34
2280	037.2		12	16	5				53
2414	038.0		12	17	6				56
2548	038.8		21	42	12				121
2682	039.5		3	31	9				71
2816	040.3		3	26	19				77
2950	041.1		5	21	10				58
3085	041.9		2	19	9				49
3219	042.6		4	59	11				122
3353	043.4		4	*74	59				221
3487	044.2		7	56	74				218
3621	044.9		4	9	*105				181
3755	045.7		3	5	80		0		135
3889	046.5		2	5	54	0	19		125
4023	047.2		1	1	30	38	23		146
4157	048.0		2	0	4	96	6		176
4292	048.8		2		3	62	10		53
4426	049.5		0		6	32	87		201
4560	050.3				79	87	*105		428
4694	051.1				42	52	67		255
4828	051.8				6	106	30	0	225
4962	052.6				12	*133	22	*20	293
5096	053.4				0	96	15	1	177
5230	054.1					113	10	3	199
5364	054.9					37	11	3	71
5499	055.7						0	5	8
5633	056.5							0	0
CIC		412	659	1655	2298	3102	1447	115	
Peak		19	27	75	108	135	108	23	
Pass		7	6	5	1	2	3	4	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 382
26 April 1971
0602 to 0634 EST

Arc 4.0 km
Ref pt 095°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m												
		240	325	373	435	497	572	625	670	778	815	870	965	VIC
0	045.1							0						0
134	047.0							6						8
268	048.9							13						17
402	050.8							12						16
536	052.7							6						8
671	054.7							5						7
805	056.6							14						18
939	058.5							17						22
1073	060.4							17						22
1207	062.3		0					11						14
1341	064.3		5			0		12						25
1475	066.2		0			2		10						17
1609	068.1		4			0		15						27
1743	070.0		6			0		26						45
1878	071.9		0	0		1		44						59
2012	073.9		6	5		11		94						161
2146	075.8		8	4		1		26						56
2280	077.7		4	15	0	5		15						58
2414	079.6		6	15	2	5		37						93
2548	081.6		15	20	5	0		43					0	120
2682	083.5		11	19	15	19		25					0	139
2816	085.4	0	12	24	43	*25	0	81					0	279
2950	087.3	*1	4	*70	34	0	1	*257	0			0	0	507
3085	089.2	0	*21	0	38	5	0	197	5			*132	0	641
3219	091.2	1	4		*55	8	37	132	6	0		0	0	363
3353	093.1	0	5		19	0	42	46	2	53			0	278
3487	095.0		0		11	0	56	0	0	157			0	416
3621	096.9				2	0	59		0	*256	0		0	596
3755	098.8				0	1	124		44	97	32		0	529
3889	100.8					1	89		55	0	99		0	387
4023	102.7					0	130		*99		*99		0	545
4157	104.6						*145		18		0		0	284
4292	106.5						23		11				0	62
4426	108.4						0		11				0	22
4560	110.4								5					10
4694	112.3								6					12
4828	114.2								9					18
4962	116.1								6					12
5096	118.1								0					0
CIC		7	398	616	802	301	2529	4159	992	2017	824	473	0	
Peak		8	29	81	64	29	152	270	107	264	164	138	0	
Pass		12	11	10	9	8	1	2	3	4	5	6	7	

Conemaugh 383
26 April 1971
0707 to 0743 EST

Arc 10.0 km
Ref pt 102°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m								
		318	380	452	500	560	633	678	741	VIC
0	087.4						0			0
134	088.2						3			5
268	088.9						3			5
402	089.7						3		0	5
536	090.5						3		2	8
671	091.2						4		2	10
805	092.0						6		3	15
939	092.8						6	0	2	13
1073	093.5			0			6	2	3	17
1207	094.3			2			6	1	5	24
1341	095.1			2			8	2	6	29
1475	095.9			3		0	14	1	8	42
1609	096.6			4		3	18	7	9	65
1743	097.4			4		6	25	8	11	86
1878	098.2			4		8	19	11	14	90
2012	098.9			5		10	12	9	17	86
2146	099.7			5		8	21	11	23	110
2280	100.5	0	0	5		9	26	12	19	114
2414	101.2	2	1	5		24	34	8	23	159
2548	102.0	3	2	6		29	29	7	20	159
2682	102.8	3	3	7	0	35	32	7	23	182
2816	103.5	4	2	8	3	27	*29	15	30	193
2950	104.3	4	3	13	4	27	28	14	*39	216
3085	105.1	6	5	17	4	15	16	31	38	212
3219	105.8	5	3	16	3	17	1	27	22	151
3353	106.6	8	5	21	4	20	1	12	38	180
3487	107.4	8	5	24	4	30	2	21	11	171
3621	108.1	5	9	25	4	38	1	15	5	169
3755	108.9	6	*17	39	8	58	1	22	13	272
3889	109.7	1	17	*40	18	*58	0	41	0	284
4023	110.5	3	11	29	24	48		54		268
4157	111.2	11	6	35	18	25		*65		249

Conemaugh 383 (continued)

Cum y, m	Dir, deg	Traverse height, m								
		318	380	452	500	560	633	678	741	VIC
4292	112.0	*28	8	9	19	22		50		213
4426	112.8	23	4	1	20	10		45		158
4560	113.5	3	10	0	24	5		55		146
4694	114.3	0	3		19	5		16		65
4828	115.1		8		17	4		11		62
4962	115.8		6		16	5		9		55
5096	116.6		2		15	5		9		47
5230	117.4		2		14	*6		8		46
5364	118.1		1		16	6		7		46
5499	118.9		2		47	6		5		89
5633	119.7		0		58	2		4		93
5767	120.4				*72	1		3		110
5901	121.2				46	0		3		71
6035	122.0				36			3		56
6169	122.7				28			2		43
6303	123.5				34			0		49
6437	124.3				18					26
6571	125.1				13					19
6706	125.8				10					14
6840	126.6				5					7
6974	127.4				5					7
7108	128.1				4					6
7242	128.9				3					4
7376	129.7				4					6
7510	130.4				4					6
7644	131.2				2					1
7778	132.0				2					1
7913	132.7				[illegible]					[illegible]
8047	133.7				0					0
CIC		441	484	1179	2314	2049	1279	2267	[illegible]	
Peak		31	21	42	75	61	36	77	50	
Pass		8	7	6	5	1	2	3	4	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 384
28 April 1971
0603 to 0626 EST

Arc 4.0 km
Ref pt 351°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 243	308	362	435	498	563	618	678	VIC
0	316.4							0		0
134	318.3							18		27
268	320.3							34		52
402	322.2							59		90
536	324.1					0		45		69
671	326.0					12	0	135		226
805	327.9			0	0	17	2	*142		248
939	329.9			1	3	22	1	111		215
1073	331.8			1	8	47	5	57	0	191
1207	333.7			2	25	54	59	64	5	341
1341	335.6			4	67	*121	*135	19	22	616
1475	337.6			5	*78	112	86	3	63	585
1609	339.5		0	7	57	100	50	4	*65	477
1743	341.4		1	*25	14	62	66	18	22	343
1878	343.3		0	11	10	39	47	40	7	251
2012	345.2		5	8	21	26	57	30	5	249
2146	347.2		*7	12	35	9	20	8	3	159
2280	349.1		4	10	42	4	16	0	3	137
2414	351.0		3	5	40	1	9	1	2	107
2548	352.9		3	3	31	0	7	1	0	79
2682	354.8	0	1	1	24		9	0		61
2816	356.8	1	1	0	16		5	1		42
2950	358.7	*2	0		15		4	0		37
3085	000.6	0			12		3			27
3219	002.5	0			6		4			17
3353	004.4	1			0		2			5
3487	006.4	0					1			2
3621	008.3						0			0
CIC		14	90	340	1805	2242	2106	2830	706	
Peak		2	9	32	84	123	136	152	68	
Pass		8	7	1	2	3	4	5	6	

Conemaugh 385
28 April 1971
0642 to 0719 EST

Arc 10.0 km
Ref pt 355°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 311	378	436	494	560	615	683	728	VIC
0	338.1	0								0
134	338.9	2								4
268	339.6	2								4
402	340.4	1								2
536	341.2	2								4
671	341.9	3								5
805	342.7	5								9
939	343.5	5								9
1073	344.2	5								9
1207	345.0	7								13
1341	345.8	6								11
1475	346.5	4								7
1609	347.3	6								11
1743	348.1	9								16
1878	348.9	9								16
2012	349.6	6								11
2146	350.4	8	0							14
2280	351.2	14	1							27
2414	351.9	*18	1							34
2548	352.7	13	1							25
2682	353.5	14	1							27
2816	354.2	9	3	0	0					21
2950	355.0	6	0	2	1					[illegible]
3085	355.8	5	2	2	2					[illegible]
3219	356.5	6	1	3	1					[illegible]
3353	357.3	2	3	5	4					[illegible]
3487	358.1	1	4	6	5					26
3621	358.8	0	5	6	4					24
3755	359.6		8	6	3					28
3889	000.4		12	11	4					44
4023	001.1		14	11	6	0				50
4157	001.9		17	18	8	8				82
4292	002.7		11	14	12	20				92
4426	003.5		18	16	18	39				147
4560	004.2		*20	22	23	15	0			129
4694	005.0		14	22	27	27	2			149
4828	005.8		8	20	34	43	0			169
4962	006.5		6	22	27	42	12			176
5096	007.3		7	22	30	*61	6			203
5230	008.1		8	25	33	51	8			201
5364	008.8		9	*29	44	36	15			215
5499	009.6		9	30	64	22	38			265
5633	010.4		11	22	*73	14	46			271
5767	011.1		12	23	65	24	67			311
5901	011.9		4	13	61	24	60			264
6035	012.7		2	13	65	28	55			266
6169	013.4		1	12	64	31	35			233
6303	014.2		1	7	32	11	38		0	145
6437	015.0		0	7	29	4	22		0	101
6571	015.7			3	21	5	25		0	88
6706	016.5			4	16	0	29		0	80
6840	017.3			0	14		*75	0	0	145
6974	018.1				13		34	1	0	78
7108	018.8				10		14	2	0	42
7242	019.6				8		9	3	0	32
7376	020.4				7		7	6	0	32
7510	021.1				6		0	21	0	41
7644	021.9				4			*36	0	60
7778	022.7				0			18	0	27
7913	023.4							8	0	12
8047	024.2							3	0	4
8181	025.0							11	0	16
8315	025.7							14	0	21
8449	026.5							8	0	12
8583	027.3							3	0	4
8717	028.0							5	0	7
8851	028.8							9	0	13
8985	029.6							4	0	6
9120	030.3							0	0	0
CIC		602	767	1419	3002	1809	2139	544	0	
Peak		19	22	32	76	62	81	38	0	
Pass		8	7	6	1	2	3	4	5	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 386
29 April 1971
0557 to 0618 EST

Arc 4.0 km
Ref pt 080°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m											VIC
		125	180	247	315	380	440	504	563	633	685	711	
0	072.3		0		0								0
134	074.2		1		1				0				3
268	076.2		21		1			0	4			0	43
402	078.1		0		7			2	33	0		54	110
536	080.0		0	0	*18		0	5	5	32		182	227
671	081.9	0	6	1	0		22	4	21	*40		*194	290
805	083.8	*2	26	*19		0	44	1	77	7	0	77	350
939	085.8	0	*40	18		24	*97	14	*204	0	18	0	688
1073	087.7	0	34	0		*48	54	*18	57		5		356
1207	089.6	1	0	0		6	21	11	32		50		171
1341	091.5	0		0		26	41	0	17		*100		244
1475	093.4			10		0	0		0		72		93
1609	095.4			6							14		25
1743	097.3			0							32		33
1878	099.2										0		0
CIC		11	459	193	97	373	999	197	1612	283	1042	1816	
Peak		12	46	27	27	61	106	28	217	67	114	211	
Pass		11	10	9	8	7	6	5	1	2	3	4	

Conemaugh 387
4 May 1971
0553 to 0619 EST

Arc 4.0 km
Ref pt 100°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m										VIC
		310	373	440	492	576	630	678	740	806	885	
0	078.9			0								0
134	080.8			1								2
268	082.7			1								2
402	084.6			5								8
536	086.6			0			0			0		0
671	088.5	0		10			2			4		26
805	090.4	*5	0	31			12			0		74
939	092.3	2	2	*24			*37			5	0	105
1073	094.2	0	7	0	0		32			10	4	83
1207	096.2		*7		4		13		0	10	4	65
1341	098.1		0		18	0	24	0	1	17	5	110
1475	100.0		1		23	4	21	4	0	1	11	110
1609	101.9		1		45	15	11	18	0	2	*24	207
1743	103.8		0		*45	43	4	8	4	1	20	229
1878	105.8				27	38	0	18	10	0	12	188
2012	107.7				11	32		23	11	12	11	178
2146	109.6				17	*76		33	12	7	12	279
2280	111.5				4	23		57	5	7	11	179
2414	113.4				0	7		76	17	20	0	192
2548	115.4					5		*90	37	2		209
2682	117.3					0		82	30	10		191
2816	119.2							18	*35	5		96
2950	121.1							7	10	0		27
3085	123.1							5	1	24		55
3219	125.0							6	2	*29		68
3353	126.9							0	8	11		35
3487	128.8								0	8		15
3621	130.7									6		12
3755	132.7									2		4
3889	134.6									0		0
CIC		25	64	258	695	870	559	1594	656	691	408	
Peak		6	12	45	55	88	40	121	38	34	30	
Pass		10	9	8	7	1	2	3	4	5	6	

Conemaugh 388
4 May 1971
0643 to 0716 EST

Arc 10.0 km
Ref pt 100°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m							VIC
		316	390	430	490	550	615	688	
0	093.1						0		0
134	093.9						4		7
268	094.6						5		9
402	095.4					0	5		9
536	096.2					1	4		9
671	096.9					4	3		12
805	097.7					4	5		16
939	098.5				0	4	5		16
1073	099.2				3	6	6		26
1207	100.0				3	7	6	0	27
1341	100.8	0	0		3	7	7	13	55
1475	101.5	1	1		3	7	7	6	44
1609	102.3	2	2		4	7	8	5	49
1743	103.1	1	3		6	8	10	5	58
1878	103.8	2	3		6	8	8	5	56
2012	104.6	2	3		8	12	8	4	64
2146	105.4	2	3	0	11	15	9	4	75
2280	106.1	2	4	3	12	14	11	7	90
2414	106.9	2	5	3	14	7	11	1	72
2548	107.7	2	5	3	11	11	13	2	79
2682	108.5	2	5	5	12	12	15	0	85
2816	109.2	1	5	10	14	12	17	1	99
2950	110.0	2	7	9	9	13	18	1	98
3085	110.8	2	7	7	10	14	16	1	95
3219	111.5	8	8	6	22	28	17	0	149
3353	112.3	9	*11	8	*22	31	13	0	156
3487	113.1	9	11	7	21	28	10	0	142
3621	113.8	*9	9	8	17	38	18	0	166
3755	114.6	5	7	9	16	*36	26	0	166
3889	115.4	8	4	10	18	34	*28	0	172
4023	116.1	4	3	9	4	33	23	0	128
4157	116.9	1	0	8	2	25	19	0	92
4292	117.7	4		7	4	19	15	0	83
4426	118.4	1		8	0	14	13	0	60
4560	119.2	0		14	0	13	15	0	63
4694	120.0			*13	1	11	12	0	54
4828	120.7			8	1	7	2	0	28
4962	121.5			8	1	5	3	0	26
5096	122.3			6	2	4	0	0	18
5230	123.1			8	1	3		0	17
5364	123.8			2	0	3		0	8
5499	124.6			4	1	3		0	12
5633	125.4			2	0	3		3	13
5767	126.1			6		2		8	27
5901	126.9			2		2		*11	27
6035	127.7			4		1		6	19
6169	128.4			1		1		7	17
6303	129.2			1		1		3	9
6437	130.0			0		2		2	7
6571	130.7					2		1	5
6706	131.5					3		0	5
6840	132.3					2			3
6974	133.0					0			0
CIC		290	380	713	939	1888	1487	344	
Peak		11	13	17	24	40	28	14	
Pass		7	6	5	4	1	2	3	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 389
5 May 1971
0600 to 0617 EST

Arc 4.0 km
Ref pt 073°
SO_2, pphm

Cum y,	Dir,	Traverse height, m							
m	deg	327	386	440	498	565	635	658	VIC
0	034.6		0						0
134	036.5		4						6
268	038.4		*15						22
402	040.3		5						7
536	042.3	0	0						0
671	044.2	2							3
805	046.1	*2		0	0				3
939	048.0	0		44	1				67
1073	049.9			34	55				142
1207	051.9			*65	40			0	163
1341	053.8			38	*88			0	203
1475	055.7			0	55		0	0	91
1609	057.6				0	0	216	0	265
1743	059.6					25	*320	0	439
1878	061.5					26	322	0	443
2012	063.4					128	332	0	640
2146	065.3					62	281	0	458
2280	067.2					*180	0	0	327
2414	069.2					38		0	69
2548	071.1					21			38
2682	073.0					0			0
CIC		14	86	648	856	1719	5269	0	
Peak		7	21	126	195	197	344	0	
Pass		7	6	5	4	1	2	3	

Conemaugh 391
10 May 1971
0559 to 0621 EST

Arc 4.0 km
Ref pt 225
SO_2, pphm

Cum y,	Dir,	Traverse height, m								
m	deg	375	418	442	506	560	633	660	688	VIC
0	213.5						0		0	0
134	215.4						61		0	81
268	217.3						20	0	0	27
402	219.2						42	*6	0	60
536	221.2						*94	0	0	126
671	223.1					0	84		0	112
805	225.0			0		59	26		0	134
939	226.9		0	7	0	78	0		0	139
1073	228.8		5	9	9	118	6		0	234
1207	230.8		7	27	25	76	0			205
1341	232.7	0	13	40	55	117				342
1475	234.6	4	20	65	*94	*132				469
1609	236.5	*2	*32	76	84	83				392
1743	238.4	0	35	*76	61	42				287
1878	240.4	0	26	30	46	31				183
2012	242.3	4	14	7	30	32				126
2146	244.2	0	0	7	13	15				54
2280	246.1		4	7	0	0				12
2414	248.1		0	0						0
CIC		36	559	1257	1490	2805	1193	21	0	
Peak		5	44	81	99	139	103	7	0	
Pass		7	8	6	5	1	2	4	3	

Conemaugh 390
5 May 1971
0625 to 0648 EST

Arc 10.0 km
Ref pt 047°
SO_2, pphm

Cum y,	Dir,	Traverse height, m				
m	deg	500	567	630	690	VIC
0	033.9	0				0
134	034.7	2				4
268	035.5	3				5
402	036.2	3				5
536	037.0	2				4
671	037.8	3				5
805	038.5	3				5
939	039.3	*9				16
1073	040.1	4				7
1207	040.9	2				4
1341	041.6	2				4
1475	042.4	3				5
1609	043.2	3				5
1743	043.9	4				7
1878	044.7	6				11
2012	045.5	6				11
2146	046.2	5				9
2280	047.0	2		0		4
2414	047.8	3		10		22
2548	048.5	6	0	14		34
2682	049.3	3	2	21		43
2816	050.1	2	1	31		56
2950	050.8	2	1	47		82
3085	051.6	2	56	108		277
3219	052.4	3	83	114		335
3353	053.1	2	108	136		413
3487	053.9	3	*121	177		504
3621	054.7	2	63	*194		429
3755	055.5	2	29	191		[illegible]
3889	056.2	0	19	162		297
4023	057.0		11	129		229
4157	057.8		11	102		185
4292	058.5		8	59		110
4426	059.3		11	10		35
4560	060.1		8	7		25
4694	060.8		8	8		27
4828	061.6		8	7		25
4962	062.4		7	6		22
5096	063.1		7	6	0	22
5230	063.9		7	8	81	158
5364	064.7		7	9	59	121
5499	065.4		7	8	24	60
5633	066.2		7	7	*126	225
5767	067.0		6	6	94	177
5901	067.7		[illegible]	7	33	75
6035	068.5		7	7	15	48
6169	069.3		8	7	10	41
6303	070.1		10	7	7	40
6437	070.8		10	4	6	33
6571	071.6		8	3	6	28
6706	072.4		11	4	6	35
6840	073.1		8	4	5	28
6974	073.9		8	4	3	25
7108	074.7		8	0	7	26
7242	075.4		8		9	25
7376	076.2		9		[illegible]	27
7510	077.0		[illegible]		[illegible]	25
7644	077.7		8		6	24
7778	078.5		8		4	20
7913	079.3		7		4	19
8047	080.0		5		6	18
8181	080.8		0		3	3
8315	081.6				0	0
CIC		330	2622	5817	2113	
Peak		11	123	200	127	
Pass		1	2	3	4	

Table 3. PLUME CROSS SECTIONS

Conemaugh 392
10 May 1971
0627 to 0713 EST

Arc 10.0 km
Ref pt 228°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m								VIC
		252	288	323	380	447	506	570	631	
0	210.3	0		0						0
134	211.1	0		1						1
268	211.9	0		2						2
402	212.6	0	0	3						4
536	213.4	0	4	4						9
671	214.2	0	2	5						8
805	214.9	0	5	5						11
939	215.7	0	4	7						12
1073	216.5	0	11	6						18
1207	217.2	0	6	7						14
1341	218.0	0	5	9						16
1475	218.8	0	1	11						14
1609	219.5	0	0	10						12
1743	220.3	0	1	10						13
1878	221.1	0	3	11						16
2012	221.9	0	6	11	0					19
2146	222.6	0	7	14	1			0		25
2280	223.4	0	8	18	0	0		3		35
2414	224.2	0	9	21	5	1	0	4		51
2548	224.9	0	11	*20	*12	1	1	1		60
2682	225.7	0	9	15	5	0	7	*37	0	108
2816	226.5	0	4	16	2	1	6	29	1	88
2950	227.2	0	2	16	2	2	32	16	2	110
3085	228.0	0	2	19	3	4	32	18	3	124
3219	228.8	0	6	15	3	4	*64	16	*3	171
3353	229.5	0	9	17	3	3	71	11	0	173
3487	230.3	0	7	15	2	3	95	10	1	206
3621	231.1	0	1	14	3	3	87	4	2	180
3755	231.8	0	2	13	5	4	73	2	0	155
3889	232.6	0	1	16	3	2	53	2		119
4023	233.4	0	1	18	1	1	43	2		100
4157	234.1	0	23	17	1	1	56	0		137
4292	234.9	0	*28	16	1	2	63			154
4426	235.7	0	5	16	3	3	52			119
4560	236.5	0	3	17	5	5	41			107
4694	237.2	0	2	18	3	11	37			108
4828	238.0	0	0	17	5	11	28			93
4962	238.8	0	0	15	5	10	28			89
5096	239.5	0	2	16	6	13	27			97
5230	240.3	0	1	17	7	17	27			106
5364	241.1	0	3	18	6	16	30			111
5499	241.8	0	5	18	6	19	23			106
5633	242.6	0	7	9	5	23	22			100
5767	243.4	0	9	10	4	22	23			102
5901	244.1	0	4	9	3	20	20			86
6035	244.9	0	3	10	3	*22	14			80
6169	245.7	0	5	7	1	20	15			73
6303	246.4	0	9	4	2	18	17			[illegible]
6437	247.2	0	4	1	1	20	15			[illegible]
6571	248.0	0	4	0	1	14	11			[illegible]
6706	248.7	0	2		2	12	9			[illegible]
6840	249.5	0	1		1	5	6			21
6974	250.3	0	0		0	1	6			11
7108	251.1	0				1	4			8
7242	251.8	0				0	3			5
7376	252.6	0					3			5
7510	253.4						4			7
7644	254.1						4			7
7778	254.9						3			5
7913	255.7						3			5
8047	256.4						2			3
8181	257.2						0			0
CIC		0	885	2092	433	1128	4155	555	43	
Peak		0	29	22	12	24	100	43	6	
Pass		7	8	6	5	4	3	1	2	

Conemaugh 393
11 May 1971
0558 to 0613 EST

Arc 4.0 km
Ref pt 325°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m								VIC
		252	323	385	446	510	566	603	624	
0	309.6			0						0
134	311.6			31						51
268	313.5	0		200						326
402	315.4	0		*244		0				398
536	317.3	0		172	0	151				522
671	319.2	0		83	29	199				502
805	321.2	0		55	59	*630				1197
939	323.1	0		22	172	577				1245
1073	325.0	0	0	0	267	457	0			1175
1207	326.9	0	4		298	162	17		0	781
1341	328.8	0	*17		*318	11	79		0	671
1475	330.8	0	6		154	0	37		0	311
1609	332.7	0	*8		95		*120	0	0	319
1743	334.6	0	2		0		27	*12	0	46
1878	336.5	0	2				0	0	0	4
2012	338.4	0	0						0	0
CIC		0	140	2891	4986	7834	1003	43	0	
Peak		0	17	248	330	636	124	20	0	
Pass		8	7	6	5	4	1	3	2	

Conemaugh 394
14 May 1971
0603 to 0620 EST

Arc 4.0 km
Ref pt 072°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m								VIC
		251	317	372	440	492	569	622	685	
0	045.1			0						0
134	047.0	0	0	19						31
268	048.9	*5	6	24						58
402	050.9	0	22	56						126
536	052.8		37	98						219
671	054.7		29	*237		0				433
805	056.6		44	172		33				[illegible]
939	058.6		53	169	0	27				[illegible]
1073	060.5		*81	29	2	15				[illegible]
1207	062.4		0	0	7	97				[illegible]
1341	064.3				68	*97			0	[illegible]
1475	066.2				93	88			0	299
1609	068.2				*198	0		0	0	317
1743	070.1				151			*14	0	264
1878	072.0				24			10	0	54
2012	073.9				113		0	0	0	181
2146	075.8				0		*128		0	222
2280	077.8						74		0	128
2414	079.7						0			0
CIC		18	974	2880	2350	1279	724	86	0	
Peak		10	131	243	205	218	133	21	0	
Pass		8	7	6	5	4	1	2	3	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 395
19 May 1971
0557 to 0611 EST

Arc 4.0 km
Ref pt 049°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 377	403	447	504	572	637	VIC
0	022.1		0					0
134	024.0		1					1
268	025.9		19					18
402	027.9	0	33					31
536	029.8	2	48					46
671	031.7	*17	*59					67
805	033.6	2	56					54
939	035.6	0	10					9
1073	037.5		0					0
1207	039.4							0
1341	041.3				0	0		0
1475	043.2			0	37	2		65
1609	045.2			77	105	2		280
1743	047.1			108	*556	13		1088
1878	049.0			184	599	40		1308
2012	050.9			*266	225	*112	0	925
2146	052.8			150	0	4	4	214
2280	054.8			30		7	*5	61
2414	056.7			18		5	0	33
2548	058.6			12		5		25
2682	060.5			11		0		15
2816	062.4			6				8
2950	064.4			0				0
CIC		75	810	3088	5452	681	32	
Peak		30	68	275	726	128	6	
Pass		5	6	4	3	1	2	

Conemaugh 396
19 May 1971
0658 to 0720 EST

Arc 10.0 km
Ref pt 061°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 445	507	565	634	689	746	VIC
0	039.5	0						0
134	040.3	2						3
268	041.0	6						10
402	041.8	9						15
536	042.6	12						20
671	043.3	12						20
805	044.1	16						26
939	044.9	20						33
1073	045.6	21						35
1207	046.4	20		0				33
1341	047.2	22		4				43
1475	047.9	23		8				52
1609	048.7	26		10				60
1743	049.5	32		10				70
1878	050.2	69		12				134
2012	051.0	78		12				149
2146	051.8	85		14				164
2280	052.5	*108		15				204
2414	053.3	100		15				191
2548	054.1	89		15				173
2682	054.9	100		17				194
2816	055.6	102		16				196
2950	056.4	76	0	19				158
3085	057.2	62	4	20				143
3219	057.9	17	5	23				75
3353	058.7	58	8	26			0	153
3487	059.5	7	15	31			0	86
3621	060.2	11	82	63		0	0	256
3755	061.0	5	148	98		3	0	415
3889	061.8	2	159	*125	0	6	0	477
4023	062.5	0	*195	67	1	9	0	440
4157	063.3		146	20	2	*91	0	407
4292	064.1		63	20	5	41	0	204
4426	064.8		32	18	8	49	0	168
4560	065.6		25	15	10	26	0	121
4694	066.4		22	17	115	21	0	286
4828	067.1		18	17	83	2	0	198
4962	067.9		17	16	*107	0	0	231
5096	068.7		19	15	36		0	115
5230	069.5		18	14	23		0	90
5364	070.2		13	14	15		0	69
5499	071.0		14	13	11		0	63
5633	071.8		14	11	6		0	51
5767	072.5		12	9	4			41
5901	073.3		12	7	5			39
6035	074.1		10	5	5			33
6169	074.8		9	0	4			21
6303	075.6		8		4			19
6437	076.4		7		4			18
6571	077.1		0		0			0
CIC		4263	3851	2977	1605	888	0	
Peak		108	202	127	120	97	0	
Pass		6	1	2	3	4	5	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 397
20 May 1971
0741 to 0817 EST

Arc 4.0 km
Ref pt 191°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 272	332	397	452	512	577	632	659	692	752	VIC
0	091.1										0	0
134	093.0										12	19
268	094.9										13	21
402	096.9										12	19
536	098.8										9	14
671	100.7										19	30
805	102.6										47	75
939	104.6										77	123
1073	106.5										80	128
1207	108.4										64	103
1341	110.3										68	109
1475	112.2										80	128
1609	114.2										*109	175
1743	116.1										77	123
1878	118.0										83	133
2012	119.9									0	74	119
2146	121.8									4	65	109
2280	123.8									7	38	69
2414	125.7									7	26	50
2548	127.6									19	26	65
2682	129.5									34	22	77
2816	131.4									33	12	60
2950	133.4									83	17	129
3085	135.3									40	34	104
3219	137.2									40	33	102
3353	139.1									95	17	144
3487	141.1									*117	18	173
3621	143.0									115	11	159
3755	144.9									44	1	56
3889	146.8									52	5	72
4023	148.7									82	4	107
4157	150.7									97	5	127
4292	152.6									84	4	110
4426	154.5									83	0	102
4560	156.4									95		117
4694	158.3									102		127
4828	160.3								0	86		106
4962	162.2								4	111		140
5096	164.1								0	58		71
5230	166.0								0	38		47
5364	167.9								6	0		5
5499	169.9								51	0		41
5633	171.8								55	0		44
5767	173.7								70	0		56
5901	175.6						0		30	0		24
6035	177.6						12		71	0		76
6169	179.5						19		87	2		103
6303	181.4	0					33		119	0		148
6437	183.3	4					83	0	121			236
6571	185.2	2					183	5	141			415
6706	187.2	7					148	0	156			373
6840	189.1	7	0				*159	7	107			359
6974	191.0	6	1				169	221	207			690
7108	192.9	*12	4				122	*332	240			777
7242	194.8	13	*11				18	150	*309			480
7376	196.8	2	11				0	63	281			316
7510	198.7	1	0		0			74	195			239
7644	200.6	0	1		1			73	75			143
7778	202.5	8	1		13			118	37			193
7913	204.4	6	1	0	17	0		44	19			101
8047	206.4	0	0	48	*34	5		15	5			157
8181	208.3			*50	19	*22		11	4			161
8315	210.2			12	1	26		8	6			77
8449	212.1			7	0	19		0	8			49
8583	214.1			7		8			0			24
8717	216.0			14		6						32
8851	217.9			4		0						6
8985	219.8			0								0
CIC		244	107	509	304	308	3389	4016	8611	5477	4162	
Peak		24	17	63	42	37	205	374	315	125	113	
Pass		10	9	8	7	6	1	2	4	3	5	

Conemaugh 398
20 May 1971
0825 to 0831 EST

Arc 10.0 km
Ref pt 199°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 450	566	VIC
0	179.8		0	0
134	180.6		3	6
268	181.3		3	9
402	182.1		4	12
536	182.9		5	15
671	183.6		3	9
805	184.4		4	12
939	185.2		4	12
1073	185.9		6	19
1207	186.7		3	9
1341	187.5		5	15
1475	188.2		6	19
1609	189.0		13	31
1743	189.8		13	40
1878	190.5	0	18	56
2012	191.3	2	69	220
2146	192.1	2	*95	301
2280	192.9	1	13	43
2414	193.6	1	43	136
2548	194.4	2	31	102
2682	195.2	2	0	6
2816	195.9	4		12
2950	196.7	9		26
3085	197.5	5		15
3219	198.2	5		15
3353	199.0	9		28
3487	199.8	6		19
3621	200.5	5		15
3755	201.3	5		18
3889	202.1	5		16
4023	202.8	*7		22
4157	203.6	6		15
4292	204.4	6		19
4426	205.1	6		19
4560	205.9	7		22
4694	206.7	10		31
4828	207.5	6		19
4962	208.2	6		19
5096	209.0	5		15
5230	209.8	3		9
5364	210.5	1		3
5499	211.3	1		3
5633	212.1	1		3
5767	212.8	1		3
5901	213.6	1		3
6035	214.4	0		0
CIC		462	1211	
Peak		11	106	
Pass		2	1	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 399
20 May 1971
0941 to 1015 EST

Arc 4.0 km
Ref pt 099°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 267	330	388	455	515	583	643	704	755	821	VIC
0	047.1										0	0
134	049.1										14	25
268	051.0										25	44
402	052.9									0	67	118
536	054.8									5	65	122
671	056.7									2	60	109
805	058.7									2	46	84
939	060.6			0	0					4	19	40
1073	062.5			10	114					14	51	320
1207	064.4			15	*151					27	73	449
1341	066.3			1	15					27	59	173
1475	068.3			4	0				0	73	77	255
1609	070.2			*15	0				31	34	50	212
1743	072.1			12	4				13	74	85	311
1878	074.0	0	0	0	0		0		20	87	107	353
2012	075.9	2	5	0	1		12		*63	78	201	603
2146	077.9	*6	1	0	2		24		17	71	*231	599
2280	079.8	5	*6	0	2		*72		68	50	129	551
2414	081.7	0	5	0	0		46	0	34	79	12	281
2548	083.6	0	*7	0	15		33	13	27	155	0	394
2682	085.6	2	0	0	7	0	2	27	24	*203		412
2816	087.5	7		0	5	7	1	50	40	130		375
2950	089.4	0		0	4	30	1	61	22	105		353
3085	091.3			0	1	*46	9	93	8	35		311
3219	093.2			0	2	13	32	92	0	19		257
3353	095.2			0	7	27	0	106		107		394
3487	097.1			2	5	18		*153		51		367
3621	099.0			0	4	15		63		31		186
3755	100.9				0	22		12		7		68
3889	102.8				5	8		0		0		22
4023	104.8				7	18						43
4157	106.7				8	0						13
4292	108.6				7							12
4426	110.5				8							13
4560	112.4				2							3
4694	114.4				0							0
CIC		79	86	211	1347	742	831	2400	1315	5266	4911	
Peak		11	7	21	209	54	85	161	72	216	262	
Pass		10	9	8	7	1	2	3	4	5	6	

Conemaugh 400
18 October 1971
0711 to 0733 EST

Arc 4.0 km
Ref pt 320°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 305	374	435	490	548	615	674	723	VIC
0	304.6				0					0
134	306.6				2					3
268	308.5				2					3
402	310.4				4		0			6
536	312.3				13		4		0	26
671	314.2		0		34		16		0	78
805	316.2		2		42		72		0	187
939	318.1		4		59		*67	0	0	208
1073	320.0		6		74		113	*41	0	373
1207	321.9	0	2		*69		56	4	0	207
1341	323.8	1	1		74	0	38	14	0	198
1475	325.8	0	4		66	59	74	13	0	279
1609	327.7	1	*7	0	34	96	6	16	0	264
1743	329.6	0	1	1	29	32	1		0	98
1878	331.5	*2	0	5	14	94	0	5	0	195
2012	333.4	1		6	6	*136		14	0	266
2146	335.4	1		*11	0	71		1	0	138
2280	337.3	1		0	0	51		1	0	88
2414	339.2	0		0	2	46		0	0	69
2548	341.1			1	0	41			0	69
2682	343.1			0		0				0
CIC		25	97	86	1852	2199	1494	416	0	
Peak		5	12	18	85	141	133	46	0	
Pass		8	7	6	1	2	3	4	5	

Conemaugh 401
18 October 1971
0738 to 0802 EST

Arc 10.0 km
Ref pt 317
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 299	368	423	490	550	610	674	727	VIC
0	313.9		0							0
134	314.7		1							2
268	315.5		0							1
402	316.2		1		0					2
536	317.0		1		1	0			0	3
671	317.8		3		2	1			0	26
805	318.5		1	0	4	23		0	0	45
939	319.3		1	1	3	25	5	8	0	61
1073	320.1	0	4	1	6	11	9	24	0	82
1207	320.8	2	*7	1	9	14	14	22	0	112
1341	321.6	1	2	5	12	54	27	*25	0	203
1475	322.4	2	3	3	19	*63	*75	19	0	300
1609	323.1	*3	1	5	28	46	41	14	0	226
1743	323.9	2	0	7	31	25	40	2	0	179
1878	324.7	1	2	9	28	29	74	0	1	236
2012	325.5	2	1	9	24	35	51		0	201
2146	326.2	3	0	*11	36	16	33		0	164
2280	327.0	3		4	*62	11	31			185
2414	327.8	3		3	52	6	23			144
2548	328.5	2		1	51	3	2			108
2682	329.3	3		0	33	4	5			76
2816	330.1	2			17	3	0			37
2950	330.8	0			0	1				2
3085	331.6					2				3
3219	332.4					0				0
CIC		107	100	215	1497	1376	1537	408	0	
Peak		8	7	21	73	65	77	26	0	
Pass		8	7	6	5	1	2	3	4	

Conemaugh 402
19 October 1971
0648 to 0707 EST

Arc 4.0 km
Ref pt 319°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 180	244	319	375	430	493	585	590	607	VIC
0	295.9	0	0								0
134	297.9	4	9				0				23
268	299.8	0	12				11				45
402	301.7	*4	11				56			0	143
536	303.6	1	19	0	0		36			0	111
671	305.6	0	17	7	33	0	88			0	273
805	307.5		12	12	58	11	122			0	396
939	309.4		4	15	*89	26	*175	0	0	0	565
1073	311.3		12	14	64	81	141	15	43	0	593
1207	313.2		*11	34	55	*130	105	56	*56	0	672
1341	315.2		20	48	37	37	67	*16	27	0	443
1475	317.1		6	78	11	37	66	0	0	0	357
1609	319.0		0	81	0	133	57			0	467
1743	320.9			*74		103	32			0	357
1878	322.8			41		91	0			0	215
2012	324.8			55		51					176
2146	326.7			8		25					53
2280	328.6			5		0					10
2414	330.5			0							0
CIC		32	476	1694	1243	2597	3496	312	451	0	
Peak		7	24	89	96	135	197	62	57	0	
Pass		9	8	7	6	5	4	3	1	2	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 403 Arc 10.0 km
19 October 1971 Ref pt 316°
0713 to 0728 EST SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 307	373	434	494	523	547	VIC
0	306.8		0					0
134	307.5		1				0	2
268	308.3		1		0		0	2
402	309.1	0	5		3		0	12
536	309.9	1	3		5		0	13
671	310.6	2	6		10		0	25
805	311.4	10	17		10		0	58
939	312.2	9	15	0	39		0	87
1073	312.9	11	22	2	109		0	188
1207	313.7	12	5	2	*144	0	0	202
1341	314.5	13	10	0	72	2	0	126
1475	315.2	16	23	4	1	*8	0	80
1609	316.0	12	27	7	0	0	0	78
1743	316.8	10	72	29			0	185
1878	317.5	8	87	22			0	196
2012	318.3	10	*98	22			0	218
2146	319.1	10	96	28			0	224
2280	319.8	7	70	82			0	262
2414	320.6	30	40	90			0	264
2548	321.4	*68	20	104			0	320
2682	322.1	11	7	*106				201
2816	322.9	15	2	41				96
2950	323.7	5	2	12				31
3085	324.5	4	2	5				18
3219	325.2	0	2	1				5
3353	326.0		1	1				3
3487	326.8		0	1				2
3621	327.5			1				2
3755	328.3			1				2
3889	329.1			1				2
4023	329.8			0				0
CIC		946	2271	2013	1408	36	0	
Peak		73	98	108	147	9	0	
Pass		6	5	4	1	3	2	

Conemaugh 404 Arc 16.0 km
19 October 1971 Ref pt 318°
0736 to 0804 EST SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 167	244	307	373	431	487	522	552	VIC
0	300.7	0								0
134	301.2	2								4
268	301.7	1								2
402	302.2	2								4
536	302.6	4								8
671	303.1	3								6
805	303.6	2								4
939	304.1	3								6
1073	304.6	5								10
1207	305.0	*7								14
1341	305.5	5								10
1475	306.0	5								10
1609	306.5	5								10
1743	307.0	4								8
1878	307.4	4								8
2012	307.9	4								8
2146	308.4	5								10
2280	308.9	4								8
2414	309.4	2								4
2548	309.8	5							0	10
2682	310.3	4							0	8
2816	310.8	2							0	4
2950	311.3	*5	0	0					0	10
3085	311.8	6	1	1				0	0	16
3219	312.2	2	2	1				1	0	10
3353	312.7	3	3	1				1	0	14
3487	313.2	4	3	3				7	0	25
3621	313.7	0	2	3			0	8	0	16
3755	314.2	1	1	3		0	1	13	0	21
3889	314.6	0	2	2		2	1	11	0	21
4023	315.1	1	4	2		2	11	6	0	34
4157	315.6	0	2	2	0	4	26	16	0	58
4292	316.1	1	4	2	1	16	35	*21	0	99
4426	316.6	2	5	4	1	40	69	16	0	179
4560	317.0	3	2	7	1	32	69	8	0	162
4694	317.5	1	3	*8	4	17	73	7	0	148
4828	318.0	0	4	6	8	21	100	1	0	144
4962	318.5		*7	5	7	32	*94	2	0	197
5096	319.0		6	6	7	*54	78	6	0	214
5230	319.4		5	*8	10	50	56	7	0	189
5364	319.9		4	5	12	44	39	0	0	150
5499	320.4		5	3	18	26	45		0	138
5633	320.9		4	3	25	33	30		0	140
5767	321.4		3	2	15	14	10		0	67
5901	321.8		3	5	20	14	3		0	72
6035	322.3		3	5	*25	13	1		0	77
6169	322.8		3	5	7	8	2		0	40
6303	323.3		2	6	3	8	1		0	32
6437	323.8		0	5	4	11	2		0	34
6571	324.2			5	4	5	2		0	25
6706	324.7			4	4	2	1		0	18
6840	325.2			5	4	1	0			17
6974	325.7			2	3	1				10
7108	326.2			3	0	0				5
7242	326.6			0						0
CIC		383	297	437	656	1612	2683	469	0	
Peak		7	8	8	27	55	104	24	0	
Pass		8	7	6	5	4	1	3	2	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 405
20 October 1971
0953 to 1027 EST

Arc 4.0 km
Ref pt 319°
SO_2, pphm

Cum y,	Dir,	Traverse height, m												
m	deg	135	175	238	303	364	419	502	553	627	675	735	795	VIC
0	292.1					0	0							0
134	294.0	0				5	1	0						10
268	295.9	3				13	1	3			0			31
402	297.9	8				7	1	1			7			33
536	299.8	14		0	0	2	0	11	0		11			54
671	301.7	9		6	1	3	6	15	3		19			96
805	303.6	6		22	7	3	9	11	4	0	20			132
939	305.6	13	0	*27	2	5	6	*20	1	2	*26			160
1073	307.5	13	7	25	1	*14	5	11	0	4	18	0		151
1207	309.4	*15	18	9	2	0	6	8	0	3	27	8		141
1341	311.3	3	*22	3	8	0	5	4	2	6	10	10		112
1475	313.2	4	23	5	23	1	4	0	*7	4	4	10		132
1609	315.2	0	21	0	*28	4	3		9	3	3	7		123
1743	317.1		15		19	2	5		7	3	2	2	0	87
1878	319.0		7		11	7	5		2	4	4	1	*3	70
2012	320.9		0		14	2	2		1	9	3	9	0	65
2146	322.8				9	0	0		0	*25	2	11		76
2280	324.8				11		0		3	26	0	*15		90
2414	326.7				0		1		2	23		11		60
2548	328.6						3		0	4		*13		33
2682	330.5						7			10		0		29
2816	332.4						*19			0				35
2950	334.4						3							6
3085	336.3						0							0
CIC		315	405	347	487	244	330	301	147	451	559	347	11	
Peak		19	25	29	30	19	20	22	11	29	33	15	5	
Pass		12	11	10	9	8	7	6	5	1	2	3	4	

Conemaugh 406
21 October 1971
0650 to 0703 EST

Arc 4.0 km
Ref pt 359°
SO_2, pphm

Cum y,	Dir,	Traverse height, m						
m	deg	371	433	496	559	625	683	VIC
0	349.4			0				0
134	351.3		0	14				24
268	353.2	0	8	15				38
402	355.2	*1	0	20	0			35
536	357.1	1	9	*27	2			65
671	359.0	0	18	5	13		0	61
805	000.9		*15	0	67		0	140
939	002.8		1		156		0	270
1073	004.8		5		180		0	318
1207	006.7		4		*231		0	405
1341	008.6		0		123		0	212
1475	010.5		1		0		0	2
1609	012.4		7				0	12
1743	014.4		14			0	0	23
1878	016.3		5			2	0	12
2012	018.2		0			*13	0	22
2146	020.1					0	0	0
CIC		7	312	290	2763	54	0	
Peak		5	27	35	233	21	0	
Pass		6	5	1	2	3	4	

Conemaugh 407
22 October 1971
0643 to 0703 EST

Arc 4.0 km
Ref pt 359°
SO_2, pphm

Cum y,	Dir,	Traverse height, m									
m	deg	245	326	381	448	506	578	624	680	751	VIC
0	328.3						0				0
134	330.2						4				6
268	332.1						9				14
402	334.0						14				22
536	335.9				0		9				14
671	337.9		0		20		29				79
805	339.8		1		16		45		0		99
939	341.7		2		*22	0	*54		5		134
1073	343.6		6	0	27	2	48		11		153
1207	345.6		*5	2	14	5	43		1		114
1341	347.5		4	4	15	*14	37		8		135
1475	349.4		2	19	16	6	21	0	12		125
1609	351.3	0	2	*24	4	7	25	5	6		118
1743	353.2	*1	1	21	2	18	15	*53	32		222
1878	355.2	2	0	16	0	19	4	16	*60	0	192
2012	357.1	1		7		14	0	39	13	*1	115
2146	359.0	1		5		9		41	1	1	85
2280	000.9	0		0		8		19	4	0	47
2414	002.8					0		37	2		54
2548	004.8							14	0		19
2682	006.7							36			49
2816	008.6							37			50
2950	010.5							29			40
3085	012.4							11			15
3219	014.4							4			5
3353	016.3							4			5
3487	018.2							2			3
3621	020.1							0			0
CIC		18	82	351	487	365	1279	1243	555	7	
Peak		5	12	32	31	20	63	55	67	2	
Pass		9	8	7	6	1	2	3	4	5	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 408
22 October 1971
0739 to 0754 EST

Arc 10.0 km
Ref pt 360° (arbitrary)
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 258	318	378	450	498	564	622	683	734	793	844	VIC
0	348.5	0											0
134	349.2	1		0									2
268	350.0	3		1		0							7
402	350.8	5		1		2							13
536	351.5	6		3		10							30
671	352.3	6		4		6							26
805	353.1	7		10		10							44
939	353.9	6	0	*18		13							61
1073	354.6	4	1	17		7							49
1207	355.4	3	6	11	0	7							44
1341	356.2	2	11	13	1	16		0					70
1475	356.9	1	12	7	0	11		1					51
1609	357.7	0	*12	3	1	13		1					47
1743	358.5	0	11	2	1	21		2					58
1878	359.2	1	10	4	0	20	0	6					65
2012	360.0	3	5	1	6	18	2	16					80
2146	000.8	5	5	1	16	*27	1	15					110
2280	001.5	7	6	0	32	24	1	7					121
2414	002.3	9	2	0	*44	10	10	7					131
2548	003.1	*10	1	0	41	12	20	16					160
2682	003.8	10	0	2	24	11	19	21					139
2816	004.6	8	0	3	17	7	18	22					120
2950	005.4	5	1	7	4	3	20	23		0			102
3085	006.1	3	1	7	2	2	*21	*24		1			99
3219	006.9	2	2	11	1	3	16	18		2			90
3353	007.7	1	5	11	0	4	14	14		7			91
3487	008.5	1	7	7	1	6	9	5		*17			84
3621	009.2	2	10	6	3	7	8	3	0	14			84
3755	010.0	1	13	5	9	7	10	5	2	7			94
3889	010.8	0	11	4	12	6	14	5	3	2			92
4023	011.5		8	3	12	11	10	2	*13	2	0		96
4157	012.3		6	1	14	4	5	1	10	2	1	*0	69
4292	013.1		5	0	7	1	4	0	2	1	*14	0	52
4426	013.8		3	1	4	0	3	2	0	1	10		37
4560	014.6		2	1	3		2	4	0	0	6		28
4694	015.4		2	0	2		1	6	0		4		23
4828	016.1		2		2		3	1	0		2		16
4962	016.9		3		1		4	0	0		0		13
5096	017.7		1		1		4		0				10
5230	018.4		0		1		3		1				8
5364	019.2				0		4		1				8
5499	020.0						7		1				13
5633	020.7						4		1				8
5767	021.5						1		0				2
5901	022.3						2						3
6035	023.1						3						5
6169	023.8						1						2
6303	024.6						0						0
CIC		401	587	591	939	1071	874	813	122	201	133	0	
Peak		11	14	20	46	28	22	26	15	19	18	2	
Pass		11	10	9	8	1	2	3	4	5	6	7	

Conemaugh 409
2 November 1971
0716 to 0722 EST

Arc 4.0 km
Ref pt 053°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 209	256	336	382	437	VIC
0	039.6				0		0
134	041.5		0		7		9
268	043.4		5		5		15
402	045.3		*6		3		21
536	047.2		4		*13		24
671	049.2		0		5		7
805	051.1				0	0	0
939	053.0			0		4	6
1073	054.9	0		*8		5	21
1207	056.8	*5		7		*12	36
1341	058.8	0		5		6	17
1475	060.7			0		0	0
CIC		18	54	72	136	97	
Peak		6	7	11	19	15	
Pass		5	4	3	2	1	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 410
3 November 1971
0917 to 0954 EST

Arc 4.0 km
Ref pt 073°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 123	182	257	322	382	438	492	554	610	670	722	787	842	VIC
0	044.2						0								0
134	046.1			0			2								3
268	048.0			1			2								5
402	049.9			1	0		6								11
536	051.9			0	1		5								9
671	053.8			0	2		7								14
805	055.7			1	4		13								28
939	057.6			1	10	0	10								33
1073	059.6			1	13	1	5							0	32
1207	061.5		0	1	11	2	3	0						0	28
1341	063.4	0	2	7	2	2	10	2						0	41
1475	065.3	1	16	15	3	4	9	1	0				0	0	84
1609	067.2	12	9	15	5	6	13	1	2				1	0	106
1743	069.2	3	*47	3	*70	9	14	1	2				1	0	251
1878	071.1	7	1	7	7	6	23	1	2		0		4	0	92
2012	073.0	3	8	15	0	4	*43	2	5		7		*12	0	157
2146	074.9	*15	3	66		48	3	0	22		26	0	0	0	305
2280	076.8	13	0	*68		*34	2	0	28	0	42	1		0	312
2414	078.8	0		20		7	2	15	39	1	62	1		0	232
2548	080.7			5		4	1	31	43	1	142	1		0	348
2682	082.6			0		0	1	37	*192	2	205	12		0	690
2816	084.5						1	31	87	10	174	*200		0	775
2950	086.4						0	20	2	8	*234	42			462
3085	088.4							*55	25	8	186	6			425
3219	090.3							10	0	62	192	0			399
3353	092.2							11		89	2				158
3487	094.1							4		*206	0				325
3621	096.1							3		54					88
3755	098.0							3		10					20
3889	099.9							0		22					34
4023	101.8									4					6
4157	103.7									0					0
CIC		193	308	813	459	455	627	817	1608	1709	4556	942	64	0	
Peak		17	58	77	73	101	47	56	202	219	234	201	32	0	
Pass		13	12	11	10	9	8	1	2	3	4	5	6	7	

Conemaugh 411
4 November 1971
0727 to 0748 EST

Arc 4.0 km
Ref pt 100°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 209	250	328	380	447	500	568	625	675	720	818	VIC
0	080.8						0		0		0		0
134	082.7		0				2		8		3		20
268	084.6		1		0		5		30		5		62
402	086.6		*5		1		8		58		11		126
536	088.5		1		6		*61		*91		41		318
671	090.4		6		*26	0	48		83		*132		499
805	092.3		6	0	21	2	4	0	3		63		177
939	094.2	0	4	*22	7	25	0	2	0	0	0		99
1073	096.2	*1	2	11	0	31		17		4		0	107
1207	098.1	1	0	15		*33		26		15		*2	148
1341	100.0	2		2		44		*194		*35		2	447
1475	101.9	2		0		9		15		39		0	90
1609	103.8	1				8		0		7			23
1743	105.8	1				3				0			6
1878	107.7	0				0							0
CIC		29	90	179	219	555	459	910	978	358	913	14	
Peak		4	8	22	31	51	109	233	121	52	158	8	
Pass		11	10	9	8	7	6	1	2	3	4	5	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 412
5 November 1971
0738 to 0751 EST

Arc 4.0 km
Ref pt 054°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m							VIC
		380	410	438	497	568	590	627	
0	032.9			0					0
134	034.8			93					107
268	036.7		0	163				0	187
402	038.6		6	*136	0			0	161
536	040.6		*19	74	4	0	0	0	107
671	042.5		11	0	4	8	46	0	61
805	044.4		0		4	60	*6	0	85
939	046.3	0			30	39	2	0	102
1073	048.2	*5			93	*76	14	0	270
1207	050.2	0			166	11	0	0	302
1341	052.1				*253	0		0	439
1475	054.0				149				259
1609	055.9				99				172
1743	057.8				0				0
CIC		18	129	1669	2873	695	244	0	
Peak		6	25	205	253	93	114	0	
Pass		6	7	5	4	1	3	2	

Conemaugh 413
5 November 1971
0758 to 0813 EST

Arc 10.0 km
Ref pt 056°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m					VIC
		438	462	503	559	620	
0	040.6	0					0
134	041.4	1					1
268	042.2	1					1
402	042.9	1			0		1
536	043.7	4	0		3		7
671	044.5	*7	1		4		12
805	045.2	1	4		4		10
939	046.0	0	10		6		18
1073	046.8		22		10		34
1207	047.5		*40	0	21		67
1341	048.3		39	1	14		56
1475	049.1		28	5	27		72
1609	049.9		12	15	39		90
1743	050.6		22	22	49		123
1878	051.4		20	*156	87		352
2012	052.2		12	98	139		351
2146	052.9		15	14	*231		389
2280	053.7		14	5	222		362
2414	054.5		4	5	129		210
2548	055.2		1	5	35		61
2682	056.0		2	2	1		6
2816	056.8		1	1	3		7
2950	057.5		1	0	2		4
3085	058.3		0		3	0	5
3219	059.1				3	*7	16
3353	059.8				1	3	6
3487	060.6				2	0	3
3621	061.4				0	1	2
3755	062.1					1	2
3889	062.9					0	0
CIC		54	888	1179	3708	43	
Peak		12	48	157	231	8	
Pass		4	5	1	2	3	

Conemaugh 414
5 November 1971
0817 to 0850 EST

Arc 16.0 km
Ref pt 054°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m									VIC
		320	391	445	500	564	620	687	740	800	
0	016.5	0									0
134	017.0	4									8
268	017.5	3									6
402	018.0	5									9
536	018.5	5									9
671	018.9	6									11
805	019.4	12									23
939	019.9	7									13
1073	020.4	8									15
1207	020.9	16									30

Conemaugh 414 (continued)

Cum y, m	Dir, deg	Traverse height, m									VIC
		320	391	445	550	564	620	687	740	800	
1341	021.3	*17									32
1475	021.8	12									23
1609	022.3	13									25
1743	022.8	13									25
1878	023.3	14									27
2012	023.7	17									32
2146	024.2	15									28
2280	024.7	7									13
2414	025.2	10									19
2548	025.7	10									19
2682	026.1	9									17
2816	026.6	7									13
2950	027.1	8									15
3085	027.6	10									19
3219	028.1	9									17
3353	028.5	8									15
3487	029.0	9									17
3621	029.5	8									15
3755	030.0	5									9
3889	030.5	3									6
4023	030.9	5									9
4157	031.4	5									9
4292	031.9	8	0								15
4426	032.4	4	1								9
4560	032.9	2	5	0							12
4694	033.3	2	8	2							20
4828	033.8	1	11	3							25
4962	034.3	2	14	2							30
5096	034.8	0	16	2							30
5230	035.3		10	2							19
5364	035.8		17	3							33
5499	036.2		*32	7							64
5633	036.7		12	9							33
5767	037.2		3	8							17
5901	037.7		1	10							16
6035	038.2		0	9							13
6169	038.6			9							13
6303	039.1			8							12
6437	039.6			6							7
6571	040.1			6							9
6706	040.6			10							15
6840	041.0			11							16
6974	041.5			12							17
7108	042.0			16							23
7242	042.5			13	0						9
7376	043.0			14	1						22
7510	043.4			19	1						29
7644	043.9			*19	2						31
7778	044.4			6	6						18
7913	044.9			4	10						22
8047	045.4			2	8						16
8181	045.8			3	7						15
8315	046.3			2	14						25
8449	046.8			1	16						27
8583	047.3			1	18						30
8717	047.8			0	30						48
8851	048.2				43						68
8986	048.7				51						80
9120	049.2				*91						143
9254	049.7				42						66
9388	050.2				23						36
9522	050.6				24						38
9656	051.1				7						11
9790	051.6				1	0					2
9924	052.1				2	3	0			0	8
10058	052.6				2	0	2			0	6
10193	053.0				10	2	8			0	32
10327	053.5				3	4	*28			0	57
10461	054.0				6	34	23			0	101
10595	054.5				1	*118	7			0	202
10729	055.0				1	73	3		0	0	119
10863	055.4				0	66	0		1	0	107
10997	055.9					40	0		1	0	66
11131	056.4					62	3		4	0	110
11265	056.9					68	1		*10	0	126
11400	057.4					18	3	0	3	0	38
11534	057.8					33	9	1	2	0	72
11668	058.3					51	0	4	2	0	91
11802	058.8					15		*10	4	0	46
11936	059.3					12		11	2	0	40
12070	059.8					10		4	1	0	24
12204	060.2					12		2	0	0	22
12338	060.7					4		1		0	8
12472	061.2					3		0			5
12607	061.7					0					0
CIC		1071	466	781	1504	2239	312	110	107	0	
Peak		19	33	21	92	130	31	13	18	0	
Pass		9	8	7	1	2	3	4	5	6	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 415
6 November 1971
0714 to 0728 EST

Arc 4.0 km
Ref pt 038°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 322	389	443	510	567	630	657	684	VIC
0	024.6	0		0						0
134	026.5	1		*48						79
268	028.4	*1	0	12		0				21
402	030.3	0	20	0	0	*77			0	155
536	032.2		*25		20	30			0	121
671	034.2		41		73	25			0	227
805	036.1		0		112	0	0		0	185
939	038.0				162		24		0	297
1073	039.9				*276		*209	0	0	708
1207	041.8				14		110	*77	0	211
1341	043.8				0		0	0	0	0
CIC		7	308	215	2353	473	1229	276	0	
Peak		9	55	103	283	122	224	77	0	
Pass		8	7	6	1	2	3	5	4	

Conemaugh 417
6 November 1971
0825 to 0857 EST

Arc 16.0 km
Ref pt 028°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 391	449	510	569	639	687	748	801	VIC
0	018.4	0								0
134	018.9	1								2
268	019.4	1								2
402	019.8	2								3
536	020.3	*8								12
671	020.8	1								2
805	021.3	3								5
939	021.8	3		0						5
1073	022.2	3	0	2						8
1207	022.7	1	3	7						17
1341	023.2	2	4	7						21
1475	023.7	1	7	5						21
1609	024.2	1	1	4						10
1743	024.6	1	1	7						14
1878	025.1	1	0	11						19
2012	025.6	1	1	13						24
2146	026.1	0	3	15		0				29
2280	026.6		6	15		1				35
2414	027.0		7	15		2				38
2548	027.5		7	13	0	1				33
2682	028.0		2	18	5	2				44
2816	028.5		9	*20	23	6		0		95
2950	029.0		*15	7	35	5	0	1		104
3085	029.4		11	9	34	6	2	1		104
3219	029.9		3	4	30	12	0	3		86
3353	030.4		2	0	32	26	0	1		100
3487	030.9		2		33	38	1	1		122
3621	031.4		1		*31	38	3	1		120
3755	031.8		0		25	*56	3	1		134
3889	032.3				26	47	17	5		151
4023	032.8				18	49	23	2		144
4157	033.3				16	39	*41	8	0	160
4292	033.8				21	42	32	3	1	154
4426	034.2				19	36	7	4	1	107
4560	034.7				8	27	12	9	2	90
4694	035.2				10	15	21	18	0	98
4828	035.7				10	7	21	16	0	83
4962	036.2				7	3	31	11	0	78
5096	036.6				2	5	32	10	0	73
5230	037.1				2	2	32	21	0	85
5364	037.6				1	2	25	19	6	78
5499	038.1				1	2	20	*27	9	88
5633	038.6				0	2	20	12	6	59
5767	039.0					2	29	8	2	60
5901	039.5					0	18	8	*11	54
6035	040.0						11	9	9	42
6169	040.5						9	10	4	34
6303	041.0						6	8	1	22
6437	041.4						4	3	2	13
6571	041.9						9	10	0	28
6706	042.4						9	1		15
6840	042.9						3	0		4
6974	043.4						6			9
7108	043.8						7			10
7242	044.3						7			10
7376	044.8						2			3
7510	045.3						1			1
7644	045.8						0			0
CIC		107	304	616	1393	1687	1662	827	193	
Peak		9	16	20	35	56	43	29	13	
Pass		8	7	6	1	2	3	4	5	

Conemaugh 416
6 November 1971
0733 to 0802 EST

Arc 10.0 km
Ref pt 031°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 256	322	386	449	508	568	630	685	737	VIC
0	016.4	0									0
134	017.2	2	0								4
268	017.9	2	2								7
402	018.7	0	6								10
536	019.5	5	5								17
671	020.2	8	3								19
805	021.0	6	2								14
939	021.8	5	3		0						14
1073	022.5	8	7		7						38
1207	023.3	12	8		15						59
1341	024.1	12	14		25						86
1475	024.9	9	*21	0	38						114
1609	025.6	6	13	1	43	0					105
1743	026.4	9	18	1	*44	1					122
1878	027.2	8	12	14	42	0					127
2012	027.9	*11	4	*33	23	14		0			141
2146	028.7	13	2	25	26	23		6			156
2280	029.5	4	2	24	15	39		16			162
2414	030.2	2	1	16	24	52	0	6			163
2548	031.0	2	1	13	25	47	6	5			159
2682	031.8	0	2	14	14	*42	15	9			154
2816	032.5		0	20	9	26	21	*68			229
2950	033.3			21	3	14	39	51			205
3085	034.1			5	1	18	21	49			149
3219	034.8			3	0	15	54	41			180
3353	035.6			2		20	72	40	0		214
3487	036.4			2		14	*70	24	35		226
3621	037.1			0		5	68	32	34		216
3755	037.9					3	42	28	37		169
3889	038.7					1	15	22	34	0	108
4023	039.5					0	0	14	38	1	77
4157	040.2							7	*43	*4	77
4292	041.0							13	28	0	60
4426	041.8							9	19	0	41
4560	042.5							6	12	0	26
4694	043.3							6	2	0	12
4828	044.1							0	0	0	0
4962	044.8									0	0
5096	045.6									1	1
5230	046.4									0	0
5364	047.1									1	1
5499	047.9									1	1
5633	048.7									1	1
5767	049.4									0	0
CIC		444	451	695	1268	1196	1515	1619	1010	32	
Peak		15	21	34	49	70	79	70	44	9	
Pass		9	8	7	6	5	1	2	3	4	

Conemaugh 418
6 November 1971
1121 to 1140 EST

Arc 4.0 km
Ref pt 038°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 264	330	390	447	510	565	630	685	748	VIC
0	030.3						0				0
134	032.2		0				32			0	51
268	034.2		5		0		*216			0	355
402	036.1		*4		*66	0	156		0	0	362
536	038.0		1	0	6	6	11		6	0	48
671	039.9		2	7	27	0	0		98	0	212
805	041.8		0	11	0	42		0	*103	0	246
939	043.8	0		11		38		*146	0	0	311
1073	045.7	*4		*75		*86		28		0	304
1207	047.6	5		0		25		19		0	79
1341	049.5	0				0		0			0
CIC		32	43	373	355	706	1487	691	742	0	
Peak		8	11	88	67	100	249	153	126	0	
Pass		9	8	7	6	1	2	3	4	5	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 419 Arc 4.0 km
9 November 1971 Ref pt 351°
0724 to 0744 EST SO$_2$, pphm

Cum y, m	Dir, deg	Traverse height, m 314	375	435	495	562	623	682	735	758	791	VIC
0	333.7			0								0
134	335.6			8		0						13
268	337.6			8		4		0				20
402	339.5	0		5		34		32				114
536	341.4	6		14		63	0	44				206
671	343.3	4		*27		61	8	58	0			254
805	345.2	2	0	6		*72	47	*37	8			275
939	347.2	*8	7	4		28	83	18	5			244
1073	349.1	0	*14	0	0	4	81	9	19			192
1207	351.0		6		5	0	*105	14	52		0	260
1341	352.9		9		37		47	0	*65		0	218
1475	354.8		2		46		37		13		0	154
1609	356.8		0		*52		11		31	0	0	137
1743	358.7				52		5		12	*22	0	125
1878	000.6				53		0		0	13	0	100
2012	002.5				21					2	0	37
2146	004.4				0					0	0	0
2280	006.4									5	0	4
2414	008.3									0	0	0
CIC		72	136	258	953	953	1519	759	734	150	0	
Peak		15	20	32	61	89	112	63	96	32	0	
Pass		10	9	8	1	2	3	4	5	7	6	

Conemaugh 420 Arc 10.0 km
9 November 1971 Ref pt 347°
0749 to 0816 EST SO$_2$, pphm

Cum y, m	Dir, deg	Traverse height, m 310	375	435	495	560	615	679	735	VIC
0	343.9		0							0
134	344.7		2		0					3
268	345.5		12		3	0				25
402	346.2		*24		14	4				69
536	347.0		16		19	0				58
671	347.8		10		8	1				31
805	348.5	0	7	0	24	7				63
939	349.3	4	4	2	33	18				100
1073	350.1	5	4	26	38	44				190
1207	350.8	*8	0	*28	*38	47				197
1341	351.6	9		29	21	54				183
1475	352.4	6		24	16	51				157
1609	353.1	3		15	14	46				126
1743	353.9	2		8	18	31				96
1878	354.7	2		8	17	19				75
2012	355.5	0		7	7	28	0			68
2146	356.2			10	4	33	2			79
2280	357.0			4	2	38	16			96
2414	357.8			3	1	54	14			115
2548	358.5			3	2	58	*20			133
2682	359.3			3	1	*84	15			165
2816	000.1			2	0	27	21			80
2950	000.8			0		14	15			46
3085	001.6					0	11			17
3219	002.4						6			9
3353	003.1						0			0
3487	003.9								0	0
3621	004.7								1	1
3755	005.4							0	2	3
3889	006.2							2	*2	6
4023	007.0							0	2	3
4157	007.7							2	1	5
4292	008.5							5	0	8
4426	009.3							11		18
4560	010.1							8		13
4694	010.8							11		18
4828	011.6							*12		19
4962	012.4							5		8
5096	013.1							3		5
5230	013.9							3		5
5364	014.7							1		2
5499	015.4							2		3
5633	016.2							2		3
5767	017.0							0		0
CIC		140	283	616	1003	2357	430	240	29	
Peak		10	24	34	41	86	25	13	3	
Pass		8	7	6	5	1	2	3	4	

Conemaugh 421 Arc 16.0 km
9 November 1971 Ref pt 359°
0850 to 0910 EST SO$_2$, pphm

Cum y, m	Dir, deg	Traverse height, m 316	447	560	690	VIC
0	342.2	0				0
134	342.7	1				3
268	343.2	0				0
402	343.6	2				7
536	344.1	1				[illegible]
671	344.6	1				[illegible]
805	345.1	3				10
939	345.6	2				7
1073	346.0	3				10
1207	346.5	3				10
1341	347.0	3	0			10
1475	347.5	4	7			37
1609	348.0	4	15			63
1743	348.4	4	5			30
1878	348.9	4	5			30
2012	349.4	5	4			30
2146	349.9	5	5			34
2280	350.4	6	3			31
2414	350.8	*6	2			28
2548	351.3	5	6		0	37
2682	351.8	4	11		0	50
2816	352.3	6	5		0	37
2950	352.8	5	4		0	30
3085	353.2	3	3	0	0	20
3219	353.7	2	4	1	0	23
3353	354.2	2	5	5	0	40
3487	354.7	1	2	18	0	68
3621	355.2	0	11	2	0	42
3755	355.6		13	5	0	58
3889	356.1		12	24	0	117
4023	356.6		8	18	0	84
4157	357.1		9	12	0	66
4292	357.6		11	13	0	78
4426	358.0		9	15	0	78
4560	358.5		9	29	0	123
4694	359.0		4	36	0	130
4828	359.5		2	58	0	195
4962	360.0		2	*75	0	249
5096	000.4		1	47	0	156
5230	000.9		2	21	0	75
5364	001.4		1	11	0	39
5499	001.9		4	[illegible]	0	19
5633	002.4		3	0	0	10
5767	002.8		1		0	3
5901	003.3		2		0	8
6035	003.8		2		0	6
6169	004.3		*13		0	42
6303	004.8		15			49
6437	005.2		3			10
6571	005.7		0			0
CIC		304	799	1404	0	
Peak		7	18	78	0	
Pass		4	3	1	2	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 422
9 November 1971
1109 to 1158 EST

Arc 4.0 km
Ref pt 021°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 253	323	380	448	513	563	633	693	746	807	873	912	983	1045	1103	1179	VIC
0	350.3										0							0
134	352.2										1							2
268	354.1										0							0
402	356.0										0							0
536	357.9										6							10
671	359.9										2							3
805	001.8										0							0
939	003.7										0							0
1073	005.6								0		1							2
1207	007.6						0		5		16							34
1341	009.5						1		22		9		0					50
1475	011.4					0	3		14		8		3					44
1609	013.3	0				1	2		34	0	2		2					62
1743	015.2	1				1	5	0	53	4	1		0					98
1878	017.2	1		0		5	3	1	*47	2	2	0	1	0				94
2012	019.1	0		2		7	11	1	36	7	1	6	3	1				114
2146	021.0	2		8		6	*22	4	36	8	2	12	8	0				166
2280	022.9	2		6	0	10	7	2	23	29	6	20	5	5				176
2414	024.8	0		4	1	7	5	11	20	30	5	17	6	1				164
2548	026.8	1	0	7	1	9	14	15	0	10	9	36	6	0				167
2682	028.7	1	1	*4	1	11	1	*14		8	14	7	12	0				118
2816	030.6	0	3	0	1	11	0	6		9	14	8	18	1				111
2950	032.5	1	*4		1	*23	0	5		22	*25	8	36	0				194
3085	034.4	2	0		3	38	2	3		25	1	12	78	0	0			246
3219	036.4	*3	1		5	6	0	4		17	0	8	44	0	4		0	140
3353	038.3	1	1		6	16		1		43		33	*99	0	15		0	321
3487	040.2	0	4		5	0		0		52		171	7	1	10		0	360
3621	042.1		1		*5					46		142	0	0	5		0	286
3755	044.1		0		1					58		*225		*75	5	0	0	543
3889	046.0		1		1					*98		46		110	14	90	0	594
4023	047.9		0		0					23		8		35	84	*85	0	395
4157	049.8		2							0		0		7	*103	94	0	349
4292	051.7		0											0	20	36	0	96
4426	053.7		1												0	0	0	2
4560	055.6		0														0	0
CIC		54	68	111	111	541	272	240	1039	1759	448	2719	1175	845	931	1093	0	
Peak		4	6	14	14	50	24	19	58	107	28	232	108	115	104	115	0	
Pass		16	15	14	13	1	2	3	4	5	6	7	8	9	10	11	12	

Conemaugh 423
12 November 1971
0718 to 0734 EST

Arc 4.0 km
Ref pt 074°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 416	444	504	570	628	685	704	736	VIC
0	058.6	0	0							0
134	060.6	0	*13							15
268	062.5	0	9							11
402	064.4	0	0		0					0
536	066.3	0			107					177
671	068.2	0			112					185
805	070.2	0		0	*179		0			296
939	072.1	0		17	96		*229		0	420
1073	074.0	0		*34	14	0	112		0	194
1207	075.9			0	0	71	32		0	141
1341	077.8					229	0		0	349
1475	079.8					*288		*0	0	438
1609	081.7					71		27	0	126
1743	083.6					228		0	0	347
1878	085.5					0			0	0
CIC		0	79	183	1820	3177	1336	97	0	
Peak		0	28	39	294	332	301	126	0	
Pass		8	7	1	2	3	4	6	5	

Conemaugh 424
12 November 1971
0749 to 0805 EST

Arc 10.0 km
Ref pt 078°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 490	566	620	680	729	796	VIC
0	065.7	0						0
134	066.5	1	0	0				7
268	067.2	0	4	10				22
402	068.0	3	1	86				139
536	068.8	4	2	25				55
671	069.5	5	0	23				45
805	070.3	*5	2	52	0			93
939	071.1	3	3	48	2		0	87
1073	071.9	0	3	*88	0		0	129
1207	072.6		3	24	3		0	46
1341	073.4		*9	1	1		0	19
1475	074.2		4	2	2	0	0	13
1609	074.9		2	1	14	1	0	27
1743	075.7		1	1	82	6	0	131
1878	076.5		0	0	133	4	0	198
2012	077.2				173	3	0	254
2146	078.0				178	16	0	282
2280	078.8				*163	*37	0	292
2414	079.5				89	6	0	135
2548	080.3				57	0	0	87
2682	081.1				10		0	14
2816	081.8				6		0	9
2950	082.6				3		0	4
3085	083.4				3			4
3219	084.1				1			1
3353	084.9				1			1
3487	085.7				2			3
3621	086.5				2			[illegible]
3755	087.2				0			[illegible]
CIC		75	122	1293	3313	261	0	
Peak		7	11	93	195	39	0	
Pass		6	1	2	3	4	5	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 425
12 November 1971
0810 to 0835 EST
Arc 16.0 km
Ref pt 066°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 496	563	616	678	736	765	VIC
0	058.3	0						0
134	058.8	2						4
268	059.3	4	0					7
402	059.8	4	1					9
536	060.2	5	1					11
671	060.7	3	0					5
805	061.2	6	1	0				12
939	061.7	9	1	2				21
1073	062.2	10	1	3				24
1207	062.6	13	1	1				26
1341	063.1	15	2	2				33
1475	063.6	15	2	6				39
1609	064.1	18	2	6	0			45
1743	064.6	*27	3	4	1			61
1878	065.0	13	3	10	1			45
2012	065.5	13	2	23	1			63
2146	066.0	15	3	28	2			77
2280	066.5	16	5	49	4			118
2414	067.0	14	4	34	3		0	88
2548	067.4	21	5	39	5		1	114
2682	067.9	9	6	54	3		1	114
2816	068.4	11	11	46	2		1	111
2950	068.9	3	15	55	11		1	132
3085	069.4	3	18	*95	5		1	188
3219	069.8	1	21	30	22	0	*1	117
3353	070.3	0	23	24	5	1	1	83
3487	070.8	1	22	54	3	1	1	126
3621	071.3	0	30	34	30	1	0	149
3755	071.8		38	42	49	1		205
3889	072.2		17	28	6	3		83
4023	072.7		30	14	12	8		98
4157	073.2		28	15	55	*11		168
4292	073.7		*86	22	*65	3		279
4426	074.2		58	1	44	0		165
4560	074.6		34	1	6			66
4694	075.1		25	1	9			56
4828	075.6		21	1	25			75
4962	076.1		26	1	36			101
5096	076.6		14	0	24			61
5230	077.0		37		17			87
5364	077.5		9		4			21
5499	078.0		4		1			8
5633	078.5		10		3			21
5767	079.0		6		0			10
5901	079.4		3		1			6
6035	079.9		2		2			6
6169	080.4		3		1			6
6303	080.9		2		1			5
6437	081.4		2		1			5
6571	081.8		2		0			3
6706	082.3		2					3
6840	082.8		0					0
CIC		899	2300	2597	1648	104	39	
Peak		27	149	115	79	15	2	
Pass		6	1	2	3	4	5	

Conemaugh 426
13 November 1971
0708 to 0734 EST
Arc 4.0 km
Ref pt 097°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m 250	319	375	431	495	560	615	675	734	788	853	913	VIC
0	070.1										0			0
134	072.0										7			11
268	073.9										0			0
402	075.9										4		0	6
536	077.8										6		1	11
671	079.7						0		0		7		2	14
805	081.6						5		5		7		27	70
939	083.6						4		12		33		31	127
1073	085.5						17		13		*55		39	197
1207	087.4	0					*14	0	4		9	0	37	102
1341	089.3	*4		0			1	4	22		11	1	*39	131
1475	091.2	1		4		0	0	15	17	0	11	4	32	133
1609	093.2	0		*4		*53	8	42	*48	1	0	12	22	306
1743	095.1	1	0	2	0	34	2	*58	0	*37	2	21	7	259
1878	097.0	0	2	2	1	9	0	17		18	52	*54	9	262
2012	098.9		*6	0	5	13		50		28	24	21	14	253
2146	100.8		1		12	9		4		17	0	18	0	98
2280	102.8		0		*35	0		18		13		38		166
2414	104.7				14			4		1		12		50
2548	106.6				0			0		0		1		2
2682	108.5				2							0		3
2816	110.4				0									0
CIC		21	32	43	247	423	183	759	433	412	817	652	931	
Peak		6	9	23	77	67	22	64	57	42	58	84	48	
Pass		12	11	10	9	1	2	3	4	5	6	7	8	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 427
13 November 1971
0739 to 0828 EST

Arc 10.0 km
Ref pt 101°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m									
		375	435	490	548	609	670	728	785	846	VIC
0	063.3									0	0
134	064.1									1	2
268	064.9							0	0	1	2
402	065.7							2	1	1	6
536	066.4							2	1	1	6
671	067.2							2	1	1	6
805	068.0							3	1	1	8
939	068.7							3	1	1	8
1073	069.5							2	2	1	8
1207	070.3							2	1	1	6
1341	071.0							4	2	1	11
1475	071.8							4	4	1	14
1609	072.6							5	*3	0	12
1743	073.3							3	2	1	9
1878	074.1							5	4	1	16
2012	074.9		0					12	2	1	23
2146	075.6		4					7	0	0	17
2280	076.4		6			0		12	1	1	31
2414	077.2		8			3		5	0	1	26
2548	077.9		7			4		5	0	1	26
2682	078.7		8	0		3		4	1	1	26
2816	079.5		6	1		3	0	4	1	*2	26
2950	080.3		6	3		7	1	4	2	*1	37
3085	081.0		6	3	0	12	1	6	0	1	46
3219	081.8		3	5	2	9	1	4		1	39
3353	082.6		2	6	3	15	5	3		1	55
3487	083.3		3	8	3	11	6	3		0	53
3621	084.1		3	6	2	12	4	2			46
3755	084.9		3	10	4	12	5	2			56
3889	085.6		3	11	3	10	1	3			48
4023	086.4		2	14	4	7	1	2			46
4157	087.2		3	6	6	4	0	2			33
4292	087.9		3	5	6	3	2	5			37
4426	088.7		4	3	6	3	0	*16			49
4560	089.5		3	10	5	3	0	3			37
4694	090.2		4	13	5	3	8	1			52
4828	091.0		6	14	3	3	1	0			41
4962	091.8		11	19	3	6	1				61
5096	092.5		14	15	3	11	17				93
5230	093.3		*15	15	2	12	14				90
5364	094.1		7	15	3	19	20				100
5499	094.9	0	6	11	4	20	*15				88
5633	095.6	4	2	9	5	14	3				58
5767	096.4	14	1	18	4	21	0				91
5901	097.2	8	1	15	3	*28					87
6035	097.9	19	3	15	3	17					90
6169	098.7	11	8	19	19	11					106
6303	099.5	11	5	33	19	10					121
6437	100.2	10	6	36	17	6					116
6571	101.0	15	6	*68	38	11					213
6706	101.8	*17	5	9	51	6					138
6840	102.5	15	3	5	38	7					107
6974	103.3	12	5	5	28	1					80
7108	104.1	9	4	5	35	1					85
7242	104.8	5	3	3	*54	0					102
7376	105.6	6	2	4	45	1					91
7510	106.4	5	1	2	23	0					49
7644	107.1	5	0	1	25						49
7778	107.9	5		2	17						38
7913	108.7	4		1	18						36
8047	109.5	3		1	11						24
8181	110.2	5		1	11						27
8315	111.0	4		0	4						13
8449	111.8	1			2						5
8583	112.5	0			2						3
8717	113.3	1			1						3
8851	114.1	0			1						2
8986	114.8				0						0
CIC		677	720	1594	1938	1179	380	509	107	86	
Peak		22	17	68	54	29	21	18	5	2	
Pass		9	8	7	1	2	3	4	5	6	

Table 3. (continued) PLUME CROSS SECTIONS

Keystone 428
16 November 1971
0904 to 0928 EST

Arc 4.0 km
Ref pt 163°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m												VIC
		254	325	380	452	504	566	620	687	744	800	856	922	
0	155.3		0											0
134	157.2	0	4		0									7
268	159.2	2	*4		1			0						12
402	161.1	2	1	0	8		0	30						67
536	163.0	*5	2	1	19		*41	*142					0	337
671	164.9	4	2	0	*33		46	77					0	260
805	166.8	2	0	0	7		0	0		0		0	0	15
939	168.8	0		1	0	0				97		8	0	160
1073	170.7			*11		*15				124		*47	0	303
1207	172.6			0		15			0	*97		42	0	236
1341	174.5			2		8			12	13		39	0	118
1475	176.4			0		7			*104	0	0	35	0	240
1609	178.4					0			53		14	8	0	122
1743	180.3								0		*103	0	0	154
1878	182.2										41		0	61
2012	184.1										0			0
CIC		54	47	54	244	161	312	892	605	1186	566	641	0	
Peak		6	8	14	40	21	49	203	108	141	110	50	0	
Pass		12	11	10	9	8	7	1	2	3	4	5	6	

Keystone 429
16 November 1971
0934 to 1007 EST

Arc 10.0 km
Ref pt 159°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m												VIC
		250	316	382	440	499	564	628	687	746	798	862	920	
0	150.5		0											0
134	151.3		1											2
268	152.1		0											0
402	152.9		0											0
536	153.6		1		0									2
671	154.4	0	*2		2									7
805	155.2	*1	1		3									8
939	155.9	0	0		11									17
1073	156.7	0	0		13									20
1207	157.5	*1	0	0	21		0							34
1341	158.2	*1	1	2	*28		6							60
1475	159.0	0	0	6	27		15							77
1609	159.8			8	19	0	28							91
1743	160.5			0	0	1	*65							113
1878	161.3			2		1	34							63
2012	162.1			3		0	6							15
2146	162.8			20		1	8	0						48
2280	163.6			*38		31	0	9		0				129
2414	164.4			32		39		40		9				196
2548	165.1			19		84		50		22				284
2682	165.9			19		*86		*53		8				272
2816	166.7			0		84		48	0	23		0		251
2950	167.5					47		12	9	29		3		159
3085	168.2					14		1	12	*29		16		112
3219	169.0					0		0	32	14		*25		112
3353	169.8								45	4	0	14		100
3487	170.5								*37	0	19	8		101
3621	171.3								20		7	6		52
3755	172.1								17		29	1		73
3889	172.8								14		*24	1	0	61
4023	173.6								5		14	4	1	38
4157	174.4								3		3	0	0	9
4292	175.1								0		1		0	2
4426	175.9										1		*1	3
4560	176.7										0		1	2
4694	177.4										1		0	2
4828	178.2										0			0
CIC		11	21	534	444	1390	580	763	695	494	355	279	11	
Peak		1	3	39	31	89	67	58	78	31	32	26	2	
Pass		12	11	10	9	8	7	1	2	3	4	5	6	

Table 3. (continued) PLUME CROSS SECTIONS

Keystone 430
16 November 1971
1127 to 1212 EST

Arc 16.0 km
Ref pt 180°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m												
		187	253	320	385	446	508	573	576	639	692	748	800	VIC
0	169.4							0						0
134	169.9							1						1
268	170.4							1						1
402	170.9							2						2
536	171.4							2						2
671	171.8							2						2
805	172.3	0						1						1
939	172.8	1			0			0						2
1073	173.3	2			1			0						5
1207	173.8	2		0	1			0						5
1341	174.2	2		1	0	0	0	1						6
1475	174.7	2		1	1	1	1	3		0				13
1609	175.2	2		2	0	0	1	5		1				15
1743	175.7	2		2	0	1	0	5	0	3			0	18
1878	176.2	2		2	0	0	0	*4	1	0			0	12
2012	176.6	*3		3	0	0	0	3	0	0			0	13
2146	177.1	2		*7	0	1	0	3	0	0		0	0	22
2280	177.6	2	0	6	0	1	0	2	0	0		1	0	23
2414	178.1	2	2	5	0	0	0	0	0	1	0	*4	0	22
2548	178.6	2	2	5	0	1	0	0	0	1	1	2	0	22
2682	179.0	2	3	*6	1	2	1	0	0	3	1	1	0	32
2816	179.5	1	2	5	2	2	0	0	1	5	0	1	0	35
2950	180.0	2	4	3	3	1	1	2	10	*8	0	*4	0	50
3085	180.5	1	3	3	1	2	*1	3	3	2	0	2	0	32
3219	181.0	0	*3	2	2	*3	0	1	4	3	3	0	0	36
3353	181.4		2	0	3	3	0	1	4	3	*7	0	0	31
3487	181.9		2		6	0	1	0	*14	0	6	0	0	35
3621	182.4		1		5		1		13		5	0	0	28
3755	182.9		1		6		0		4		3	0	0	17
3889	183.4		0		*9		0		1		1	0	0	17
4023	183.8		1		6		1		0		0	1	0	15
4157	184.3		0		4		2				0	1	0	10
4292	184.8		0		3		0				0	0	0	6
4426	185.3		1		2						1		0	5
4560	185.8		1		3						0		0	7
4694	186.2		0		0								0	0
CIC		115	100	190	211	64	36	150	197	107	100	61	0	
Peak		4	5	7	9	4	3	6	16	9	8	4	0	
Pass		12	11	10	9	8	7	6	1	2	3	4	5	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 431
17 November 1971
0732 to 0851 EST

Arc 10.0 km
Ref pt 011°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m									VIC
		275	335	400	455	522	575	635	695	755	
0	348.7			0							0
134	349.5			1							2
268	350.3			1							2
402	351.0			1							2
536	351.8			1							2
671	352.6			1							2
805	353.3			1							2
939	354.1	0		1							2
1073	354.9	2		0							3
1207	355.6	*4		0							6
1341	356.4	1		3							6
1475	357.2	4	0	2							10
1609	357.9	1	1	7							14
1743	358.7	1	1	*11	0						21
1878	359.5	1	1	5	1						13
2012	000.2	1	2	4	6						21
2146	001.0	1	2	1	5						15
2280	001.8	1	2	0	8						18
2414	002.5	1	3		19						38
2548	003.3	1	*5		*19	0					41
2682	004.1	1	5		2	32					64
2816	004.9	1	5		2	77					137
2950	005.6	1	5		7	32					73
3085	006.4	2	5		3	22					52
3219	007.2	2	5		0	61					109
3353	007.9	2	5			*86					149
3487	008.7	2	7			71					129
3621	009.5	2	5			40					76
3755	010.2	2	3			43					77
3889	011.0	2	2			33					59
4023	011.8	2	0			27					46
4157	012.5	2	1			27					48
4292	013.3	2	0			49					82
4426	014.1	2				19					34
4560	014.8	0				22					35
4694	015.6					8					13
4828	016.4					30					48
4962	017.1					35					56
5096	017.9					5					8
5230	018.7					0					0
5364	019.5						0				0
5499	020.2						1				1
5633	021.0						15				22
5767	021.8						9				13
5901	022.5						6				9
6035	023.3						5				7
6169	024.1						23			0	34
6303	024.8						70			0	105
6437	025.6						90			0	135
6571	026.4						84			0	126
6706	027.1						74			0	111
6840	027.9						59			0	88
6974	028.7						35		0	0	52
7108	029.4						53		4	0	86
7242	030.2						52		1	0	79
7376	031.0						28		1	0	43
7510	031.7						5		0	0	7
7644	032.5						2		0	0	3

Conemaugh 431 (continued)

Cum y, m	Dir, deg	Traverse height, m									VIC
		275	335	400	455	522	575	635	695	755	
7778	033.3						19		0	0	28
7913	034.1						37		0	0	55
8047	034.8						49		1	0	75
8181	035.6						*160		0	0	239
8315	036.4						71		1	0	108
8449	037.1						18		3	0	32
8583	037.9						32		1	0	49
8717	038.7						20	0	3	0	35
8851	039.4						100	1	4	0	158
8986	040.2						103	1	2	0	159
9120	041.0						60	3	3	0	99
9254	041.7						11	5	3	0	29
9388	042.5						0	4	2	0	10
9522	043.3							5	2	0	11
9656	044.0							6	6	0	19
9790	044.8							6	9	0	24
9924	045.6							8	15	0	37
10058	046.3							10	21	0	50
10193	047.1							16	20	0	58
10327	047.9							15	20	0	56
10461	048.7							19	20	0	63
10595	049.4							21	18	0	63
10729	050.2							30	19	0	79
10863	051.0							30	23	0	85
10997	051.7							59	40	0	159
11131	052.5							106	52	0	253
11265	053.3							153	51	0	327
11400	054.0							206	51	0	412
11534	054.8							*233	80	0	502
11668	055.6							*233	64	0	476
11802	056.3							*233	94	0	524
11936	057.1							98	169	0	428
12070	057.9							22	*215	0	380
12204	058.6							24	165	0	303
12338	059.4							20	86	0	170
12472	060.2							9	82	0	146
12607	060.9							0	42	0	67
12741	061.7								30	0	48
12875	062.5								37	0	59
13009	063.3								33	0	53
13143	064.0								35	0	56
13277	064.8								23	0	37
13411	065.6								14	0	22
13545	066.3								9	0	14
13679	067.1								10	0	16
13814	067.9								9	0	14
13948	068.6								6	0	10
14082	069.4								5	0	8
14216	070.2								6	0	10
14350	070.9								5	0	8
14484	071.7								5	0	8
14618	072.5								5	0	8
14752	073.2								5	0	8
14886	074.0								5	0	8
15021	074.8								4	0	6
15155	075.5								0	0	0
CIC		158	233	143	258	2576	4625	5645	5871	0	
Peak		8	8	11	22	87	171	233	229	0	
Pass		6	5	4	3	1	2	7	8	9	

Table 3. (continued) PLUME CROSS SECTIONS

Conemaugh 432
17 November 1971
1015 to 1034 EST

Arc 4.0 km
Ref pt 044°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m								
		420	448	509	570	630	695	720	750	VIC
0	019.0	0					0			0
134	020.9	0	0				2			2
268	022.9	0	4	0			7			13
402	024.8	0	0	6			21		0	35
536	026.7	0	0	19			1		0	32
671	028.6	0	2	25		0	15		0	61
805	030.6	0	*1	*31		21	9	0	0	97
939	032.5	0	0	24		126	15	5	0	269
1073	034.4	0		0		106	28	*37	0	236
1207	036.3	0				118	74	26	0	303
1341	038.2				0	207	63	35	0	444
1475	040.2				4	398	*125	17	0	828
1609	042.1				13	*817	126	2	0	1527
1743	044.0				48	615	41	0	0	1145
1878	045.9				35	457	17	0	0	833
2012	047.8				*63	86	35	5	0	289
2146	049.8				0	0	5	5	0	10
2280	051.7						4	2	0	6
2414	053.6						4	6	0	9
2548	055.5						0	0	0	0
CIC		0	25	376	584	10571	2121	501	0	
Peak		0	11	35	65	840	132	37	0	
Pass		8	7	6	1	2	3	5	4	

Conemaugh 433
17 November 1971
1041 to 1105 EST

Arc 10.0 km
Ref pt 039°
SO_2, pphm

Cum y, m	Dir, deg	Traverse height, m						
		455	512	577	630	693	745	VIC
0	017.5	0	0				0	0
134	018.3	0	5			0	0	8
268	019.0	0	6			4	0	16
402	019.8	0	6			0	0	10
536	020.6	0	8			0	0	13
671	021.3	0	5			5	0	16
805	022.1	0	6			0	0	10
939	022.9	0	4			1	0	8
1073	023.6	0	7			2	0	14
1207	024.4	0	7			13	0	31
1341	025.2	0	7		0	93	0	153
1475	025.9	0	8		5	126	0	213
1609	026.7	0	*8		6	104	0	181
1743	027.5	0	11		13	109	0	204
1878	028.2	0	17		44	98	0	245
2012	029.0	0	8		*111	71	0	293
2146	029.8	0	6		107	122	0	361
2280	030.5	0	4		59	77	0	215
2414	031.3	0	4		15	*256	0	420
2548	032.1	0	1		15	27	0	66
2682	032.9	0	0		15	8	0	35
2816	033.6	0			2	42	0	67
2950	034.4	0			0	37	0	56
3085	035.2	0				63	0	96
3219	035.9	0				15	0	23
3353	036.7					8	0	12
3487	037.5					0	0	0
3621	038.2						0	0
3755	039.0						0	0
3889	039.8			0			0	0
4023	040.5			2			0	3
4157	041.3			0				0
4292	042.1			30				47
4426	042.8			45				71
4560	043.6			*71				112
4694	044.4			65				102
4828	045.1			40				63
4962	045.9			18				28
5096	046.7			4				6
5230	047.5			0				0
CIC		0	459	985	1404	4589	0	
Peak		0	22	81	118	297	0	
Pass		3	2	1	4	5	6	

GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER

Table 4 presents the peak ground-level SO_2 concentrations measured during lengthwise flights under the plume. Each value is the maximum concentration in an interval of one kilometer, centered on the designated kilometer. The individual flights are identified by beginning and ending times and locations, with corresponding SO_2 concentrations arranged under their respective distances downwind.

Table 5 summarizes the ground-level SO_2 concentrations obtained during crosswind flights under the plume. Although each arc distance from the plant is specified, most of the traverses were executed at distances corresponding to the cross sections. Each flight is identified by beginning and ending times and a rectangular origin near the plume center. The data are then listed in the plus y and negative y directions with the concentration at the origin repeated for both segments; actual flights, however, were continuous across the plume.

The values shown in Table 5 are instantaneous readings reduced at 6-second intervals. This corresponds to a crosswind distance increment of 134.1 meters. Occasionally, only plus y or negative y segments are presented; this occurs if the origin was established outside the plume or if restrictions prevented a complete crosswind flight. Incomplete flights are recognizable by the absence of a zero at the end of one or both segments.

In Tables 4 and 5, the SO_2 concentrations are net plume values obtained by subtracting the ambient SO_2 and CO_2 background. Completely zero flights are included in both tables to indicate the absence of ground-level SO_2 concentrations at that particular time and location.

Table 4. PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER

Legend

EST : Time of beginning and end of each flight.
Begin : Location of flight beginning in whole degrees of azimuth and kilometers to nearest tenth from Conemaugh or Keystone stacks.
End : Location of flight terminus in whole degrees of azimuth and kilometers to nearest tenth from Conemaugh or Keystone stacks.
Distance, etc. : Successive one-kilometer intervals downwind from plant centered on designated whole kilometer.
SO_2, pphm : Peak SO_2 concentration per kilometer interval in whole parts per hundred million by volume.
* : Indicates that SO_2 concentrations beyond 25 kilometers are continued on last two pages of table.

Table 4. PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 21 April 1971																											
0954-1001	089°/ 0.5	089°/16.0	3	4	3	5	13	18	25	11	12	14	13	14	3	1	0	0									
1010-1014	109°/16.0	109°/10.0										9	16	23	23	16	19	20									
1021-1029	107°/10.0	107°/ 0.5	1	1	0	1	24	32	60	38	33	11															
1058-1107	107°/ 0.5	107°/16.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
1116-1120	107°/16.0	107°/10.0										3	8	4	5	5	4	1									
1129-1138	089°/10.0	089°/25.0										13	15	15	18	16	16	14	11	9	6	9	5	8	9	9	9
1138-1158	089°/25.0	089°/ 0.5	0	3	13	61	10	27	13	18	25	25	16	8	3	0	6	10	13	13	13	15	9	8	8	9	9
1158-1206	089°/ 0.5	089°/13.0	1	0	1	11	25	15	15	4	0	0	0	0	3												
1206-1218	089°/13.0	089°/ 0.5	4	79	30	0	0	0	0	16	2	1	0	5	5												
Conemaugh Plume 22 April 1971																											
0721-0724	099°/ 4.0	099°/ 0.5	2	7	15	34																					
0724-0727	099°/ 0.5	099°/ 5.0	1	22	30	15	17																				
0753-0756	112°/10.0	112°/16.0										8	6	5	5	3	4	4									
0802-0806	112°/16.0	112°/10.0										14	14	11	9	6	4	6									
0806-0812	112°/10.0	112°/18.0										9	7	9	7	7	7	8	4	1							
0812-0819	112°/18.0	112°/ 9.0									5	4	5	5	16	5	2	1	1	0							
0829-0831	099°/ 4.0	099°/ 0.5	0	1	10	12																					
0831-0834	099°/ 0.5	099°/ 6.0	0	4	4	7	2	1																			
0834-0838	099°/ 6.0	099°/ 0.5	0	8	11	4	4	1																			
Conemaugh Plume 23 April 1971																											
0743-0747	117°/ 4.0	117°/10.0				0	0	1	1	10	24	25															
0753-0756	122°/10.0	122°/ 6.0						3	10	27	16	20															
0756-0801	122°/ 6.0	130°/16.0						8	5	14	29	29	29	30	33	30	4	4									
0805-0816	124°/16.0	124°/ 0.5	0	0	1	7	6	9	12	19	25	19	20	16	15	14	12	12									
0831-0846	131°/ 0.5	131°/22.0	1	0	0	28	21	28	24	27	25	87	59	69	41	30	12	14	14	15	16	15	14	11			
0846-0905	131°/22.0	131°/ 0.5	1	24	20	30	40	44	35	36	49	39	29	29	32	25	15	24	17	15	15	15	14	11			
1017-1022	113°/ 0.5	113°/10.0	3	16	34	72	60	33	22	33	38	21															
1027-1033	113°/10.0	113°/ 0.5	6	30	46	57	58	19	20	20	19	18															
1033-1044	113°/ 0.5	113°/20.0	145	171	14	14	16	19	25	28	17	12	9	12	11	5	6	5	4	4	4	3					
1044-1100	113°/20.0	113°/ 0.5	103	38	1	3	3	3	1	1	5	7	6	7	9	10	1	6	5	5	3	4					
1100-1104	109°/ 0.5	109°/ 7.0	29	91	51	6	4	5	4																		
1104-1108	113°/ 7.0	113°/ 0.5	1	16	48	6	1	0	2																		
1108-1117	113°/ 0.5	113°/16.0	4	1	1	3	9	21	15	11	10	0	0	1	0	0	0	0									

Table 4. (continued). PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 23 April 1971 (continued)																											
1117-1128	113°/16.0	113°/ 0.5	3	5	24	51	21	15	12	1	1	5	7	2	0	0	0	0									
1128-1132	113°/ 0.5	113°/ 7.0	5	209	39	6	7	6	10																		
1132-1136	113°/ 7.0	113°/ 0.5	2	11	68	26	3	4	9																		
1136-1140	113°/ 0.5	113°/ 7.0	2	0	2	4	6	5	4																		
1140-1144	113°/ 7.0	113°/ 0.5	2	9	9	3	3	3	3																		
Conemaugh Plume 24 April 1971																											
0828-0845	051°/22.0	051°/ 0.5	56	3	17	53	41	14	10	11	2	4	5	7	7	6	9	11	13	11	7	7	6	6			
0858-0907	059°/ 0.5	059°/20.0	2	4	7	15	61	45	62	35	12	10	9	5	3	2	2	1	1	1	0	0					
0907-0918	059°/20.0	059°/ 6.0						7	11	3	3	0	1	1	1	1	0	0	1	0	1	0					
0921-0928	059°/ 6.0	059°/ 0.5	5	1	1	3	10	14																			
Conemaugh Plume 26 April 1971																											
0638-0640	090°/ 4.0	090°/ 0.5	1	5	5	17																					
0640-0651	090°/ 0.5	090°/20.0	2	0	4	5	5	4	3	5	11	14	14	14	15	14	11	8	5	3	1	1					
0651-0700	090°/20.0	090°/10.0										19	21	19	18	13	11	11	9	3	0	1					
0748-0755	108°/10.0	108°/ 0.5	1	1	1	0	0	1	5	10	13	11															
0919-0928	108°/ 0.5	108°/16.0	0	0	0	0	0	1	5	10	10	7	6	6	7	7	6	5									
0937-0941	106°/16.0	106°/10.0										5	5	4	3	5	5	10									
0946-0951	108°/10.0	108°/ 4.0				20	5	10	17	16	11	12															
0954-0957	102°/ 4.0	102°/ 0.5	1	7	22	30																					
0957-1006	108°/ 0.5	108°/16.0	1	1	1	7	28	37	30	29	21	6	5	4	3	3	1	0									
1006-1016	108°/16.0	108°/ 0.5	0	0	0	1	1	4	17	17	14	4	1	3	1	4	0	0									
1016-1020	108°/ 0.5	108°/ 7.0	3	0	0	2	1	0	0																		
1020-1024	108°/ 7.0	108°/ 0.5	0	0	1	3	7	1	0																		
Conemaugh Plume 28 April 1971																											
0629-0632	343°/ 4.0	343°/ 0.5	1	1	2	2																					
0632-0638	343°/ 0.5	343°/10.0	3	0	0	0	2	0	0	0	0	1															
0720-0727	003°/10.0	003°/ 0.5	1	1	2	7	19	18	2	10	10	15															
0748-0754	003°/ 0.5	003°/10.0	1	1	0	0	0	0	0	4	6	3															

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
										Conemaugh Plume 29 April 1971																	
0622-0624	080°/ 4.0	080°/ 0.5	1	0	1	1																					
0624-0637	090°/ 0.5	090°/25.0	1	0	0	2	6	19	11	15	10	15	16	17	17	19	19	15	11	10	9	7	6	6	5	5	6
0637-0650	090°/25.0	090°/ 9.0									11	20	25	26	20	17	16	15	7	9	11	14	6	5	5	5	5
0748-0755	090°/ 0.5	090°/16.0	0	1	3	22	59	87	17	24	14	30	15	17	15	6	5	3									
0755-0800	090°/16.0	090°/10.0										36	29	6	5	3	3	2									
										Conemaugh Plume 4 May 1971																	
0623-0625	090°/ 4.0	090°/ 0.5	0	0	6	0																					
0625-0633	090°/ 0.5	090°/16.0	0	3	2	1	4	6	6	8	3	1	2	3	1	1	0	0									
0633-0637	090°/16.0	090°/10.0										1	3	8	3	1	1	1									
0721-0724	109°/10.0	109°/16.0										7	9	9	7	8	10	9									
0724-0733	109°/16.0	109°/ 0.5	0	1	4	14	22	4	9	10	7	12	12	10	9	9	9	9									
0906-0908	109°/ 4.0	109°/ 0.5	1	1	6	9																					
0908-0913	109°/ 0.5	109°/10.0	1	1	8	1	3	20	24	16	15	8															
0919-0927	101°/10.0	101°/25.0										14	11	11	10	10	14	13	10	9	6	5	5	5	4	4	4
0930-0937	101°/25.0	101°/16.0																6	9	5	5	5	5	6	8	9	9
0948-1001	109°/16.0	109°/ 0.5	1	7	11	28	26	15	14	14	11	5	5	6	9	9	7	6									
1001-1005	104°/ 0.5	104°/ 7.0	2	1	0	0	6	6	6																		
1005-1010	104°/ 7.0	104°/ 0.5	3	19	61	24	47	10	9																		
1010-1014	104°/ 0.5	104°/ 7.0	3	2	2	9	12	11	9																		
1014-1018	104°/ 7.0	104°/ 0.5	1	2	7	24	19	7	9																		
1018-1022	104°/ 0.5	104°/ 7.0	1	1	1	0	0	0	1																		
1022-1027	104°/ 7.0	104°/ 0.5	3	51	29	0	1	1	1																		
										Conemaugh Plume 5 May 1971																	
0655-0701	038°/10.0	038°/ 0.5	0	0	1	3	3	4	5	9	8	10															
0701-0713	042°/ 0.5	042°/22.0	0	1	0	2	4	1	0	3	13	16	18	19	18	16	14	14	16	10	8	6	4	3			
0713-0727	042°/22.0	042°/ 0.5	0	0	9	9	6	5	11	13	16	29	33	14	14	13	11	10	10	9	6	5	4	5			
0740-0753	042°/ 0.5	042°/22.0	0	0	4	3	3	4	6	5	9	7	11	10	13	13	9	9	8	9	10	14	14	15			
0850-0905	047°/22.0	047°/ 0.5	9	30	20	6	6	15	9	19	19	6	5	6	6	8	9	10	6	6	7	8	10	7			
0919-0924	047°/ 0.5	047°/ 9.0	2	0	0	3	1	15	15	5	7																
0924-0930	047°/ 9.0	047°/ 0.5	1	2	3	2	3	5	15	7	12																
0930-0935	047°/ 0.5	047°/ 9.0	3	2	4	2	4	7	26	10	3																
0935-0942	047°/ 9.0	047°/ 0.5	0	10	2	3	54	7	10	3	2																

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 7 May 1971																											
0813-0820	277°/11.0	277°/24.0											0	30	9	3	3	3	3	3	3	3	3	3	3	3	
0829-0839	273°/24.0	273°/10.0										0	0	0	1	0	2	4	2	3	2	3	3	3	3	3	
0856-0903	277°/10.0	277°/ 0.5	15	5	4	5	4	4	3	3	3	1															
0916-0929	291°/ 0.5	291°/22.0	18	15	14	15	15	10	11	8	4	3	0	4	3	26	19	15	4	1	1	1	1	1			
1034-1045	291°/ 0.5	291°/20.0	1	1	0	0	0	1	2	2	3	2	3	4	6	6	5	5	4	4	4	4					
1045-1058	291°/20.0	291°/ 0.5	32	19	10	14	4	10	1	3	3	4	4	6	6	5	10	5	4	3	4	4					
1058-1100	291°/ 0.5	291°/ 4.0	6	3	15	1																					
1105-1108	313°/ 4.0	313°/ 0.5	3	18	6	5																					
1108-1117	313°/ 0.5	313°/16.0	3	3	9	9	4	6	10	7	5	11	11	12	11	10	5	5									
Conemaugh Plume 10 May 1971																											
0715-0718	235°/10.0	235°/16.0										0	0	0	0	0	0	0									
0718-0727	235°/16.0	235°/ 0.5	2	1	0	2	2	2	1	1	1	1	1	0	0	0	0	0									
0853-0915	227°/ 0.5	227°/40.0	67	67	36	33	32	14	10	7	8	7	7	7	7	7	7	8	7	5	5	6	5	5	10	9	19*
0915-0928	227°/40.0	227°/20.0																				15	14	16	15	21	20*
0928-0940	227°/20.0	227°/40.0																				15	20	16	17	17	16*
0940-1006	227°/40.0	227°/ 0.5	27	19	12	14	17	17	11	7	10	10	19	21	17	20	19	17	27	26	17	21	21	35	15	12	12*
1006-1008	041°/ 0.5	041°/ 3.0	24	46	30																						
1008-1010	041°/ 3.0	041°/ 0.5	46	54	52																						
1023-1025	211°/ 0.5	211°/ 4.0	20	25	33	39																					
1033-1036	211°/ 4.0	211°/10.0				15	16	21	11	10	9	8															
1036-1042	211°/10.0	211°/ 0.5	8	9	10	8	11	12	10	9	8	5															
1042-1044	041°/ 0.5	041°/ 3.0	13	10	0																						
Conemaugh Plume 11 May 1971																											
0614-0616	327°/ 4.0	327°/ 0.5	7	9	10	14																					
0616-0628	327°/ 0.5	327°/20.0	9	7	10	11	9	13	15	6	10	9	1	0	0	149	153	10	6	5	5	5					
0628-0636	327°/20.0	327°/10.0										24	24	0	1	5	6	6	5	6	6	5					
0636-0640	327°/10.0	327°/16.0										4	3	2	6	53	6	6									
0730-0741	339°/16.0	339°/ 0.5	7	10	14	15	15	14	12	11	12	17	14	13	12	14	17	17									
0828-0845	327°/ 0.5	327°/28.0	11	12	12	9	7	6	5	9	12	12	21	25	28	21	19	21	22	20	17	17	21	15	12	12	11*
0845-0906	327°/28.0	327°/ 0.5	5	9	11	17	31	32	32	34	40	31	22	17	17	18	17	11	9	11	20	24	25	20	17	15	15*
0906-0912	327°/ 0.5	327°/10.0	5	8	6	9	11	5	6	20	49	60															
0918-0922	327°/10.0	327°/ 4.0				16	24	21	20	25	15	13															
0926-0928	327°/ 4.0	327°/ 0.5	8	12	9	4																					

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 11 May 1971 (continued)																											
0939-0949	327°/ 0.5	327°/22.0	0	0	0	15	44	21	24	25	28	4	6	6	11	11	11	8	9	5	5	4	5	10			
1143-1149	318°/10.0	318°/ 0.5	0	0	0	0	0	0	0	0	0	0															
1200-1205	358°/ 0.5	358°/10.0	0	1	35	39	8	56	26	10	11	11															
1205-1211	358°/10.0	358°/ 0.5	0	0	1	8	50	39	25	21	9	4															
1211-1225	358°/ 0.5	358°/24.0	0	0	0	0	0	1	8	14	8	13	13	21	13	6	4	4	4	3	2	2	1	2	2	6	
Conemaugh Plume 14 May 1971																											
0621-0624	052°/ 4.0	052°/ 0.5	0	0	1	5																					
0624-0637	041°/ 0.5	041°/22.0	3	0	0	1	4	9	21	19	25	30	16	22	23	21	20	19	19	19	18	15	13	5			
0651-0706	047°/22.0	047°/ 0.5	0	0	0	0	1	8	14	11	9	9	8	8	10	11	18	16	15	8	6	8	8	9			
0718-0730	055°/ 0.5	055°/22.0	0	0	0	0	0	0	1	1	3	4	5	4	4	3	2	3	4	8	4	4	5	5			
0839-0847	066°/22.0	066°/10.0										4	4	6	6	1	2	4	5	5	5	4	4	3			
0854-0901	090°/10.0	090°/24.0										19	24	26	25	24	23	23	22	14	14	14	10	11	10	10	
0901-0919	090°/24.0	090°/ 0.5	1	1	0	0	0	3	10	9	8	14	15	18	24	26	13	15	16	18	18	15	15	11	10	10	
0930-0934	075°/ 0.5	075°/ 7.0	0	3	11	30	5	18	29																		
0934-0936	075°/ 7.0	075°/ 4.0				25	22	28	38																		
0941-0943	068°/ 4.0	068°/ 0.5	3	2	34	50																					
0943-0953	075°/ 0.5	075°/20.0	3	58	45	6	3	5	14	21	20	14	16	11	9	11	6	10	11	13	14	13					
0953-0959	075°/20.0	075°/10.0										18	20	15	11	13	12	11	10	13	11	13					
1011-1015	075°/ 7.0	075°/ 0.5	5	58	29	107	88	24	25																		
1015-1020	075°/ 0.5	075°/10.0	8	2	20	43	27	35	30	32	33	13															
1020-1026	075°/10.0	075°/ 0.5	9	35	31	26	47	36	31	29	18	15															
1230-1235	075°/ 0.5	075°/10.0	8	19	5	1	1	0	0	2	3	2															
1240-1243	090°/10.0	090°/16.0										11	11	8	9	10	8	7									
1243-1255	090°/16.0	090°/ 0.5	5	4	5	25	31	21	11	10	14	21	13	14	16	10	8	5									
Conemaugh Plume 15 May 1971																											
0537-0545	353°/12.0	353°/ 0.5	10	77	93	46	29	28	17	12	14	15	198	183													
0545-0549	174°/ 0.5	174°/ 6.0	17	25	70	128	130	19																			
0549-0552	174°/ 6.0	174°/ 0.5	20	28	50	33	11	7																			
0610-0619	353°/ 0.5	353°/16.0	4	5	25	25	28	34	45	43	38	26	22	20	6	5	2	1									
0619-0623	353°/16.0	353°/10.0										12	12	7	3	4	3	3									
0632-0638	002°/10.0	002°/ 1.5		20	25	24	25	28	22	17	24	24															
0642-0644	002°/ 0.5	002°/ 4.0	11	11	15	15																					
0649-0703	002°/ 4.0	002°/28.0				15	17	20	12	9	7	6	7	14	12	15	10	5	3	1	1	1	4	12	14	12	4*

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 15 May 1971 (continued)																											
0703-0721	353°/28.0	353°/ 0.5	34	12	11	10	7	6	5	7	6	10	9	10	16	11	6	5	5	5	6	14	10	15	12	7	6*
0734-0748	353°/ 0.5	353°/28.0	28	28	9	12	16	12	11	7	6	10	12	14	14	12	12	12	10	10	10	9	12	11	12	11	10*
0822-0833	353°/28.0	353°/10.0										13	23	9	9	6	5	5	5	5	5	6	6	6	8	13	14*
0840-0849	002°/10.0	002°/26.0										24	43	41	24	13	10	6	6	6	5	4	5	4	3	1	0*
0849-0910	002°/26.0	002°/ 0.5	4	4	5	15	33	46	56	25	1	9	4	1	3	5	1	1	2	1	1	1	2	3	2	1	1*
0924-0930	002°/ 0.5	002°/10.0	5	10	14	8	4	5	20	17	14	10															
0930-0937	002°/10.0	002°/ 0.5	6	11	4	3	4	10	15	11	9	5															
0937-0940	002°/ 0.5	002°/ 4.0	4	16	10	9																					
1012-1017	353°/ 0.5	353°/10.0	4	3	4	4	10	4	3	4	10	10															
1017-1023	353°/10.0	353°/ 0.5	21	12	22	25	6	4	5	9	11	10															
Conemaugh Plume 17 May 1971																											
0948-0950	087°/ 4.0	087°/ 0.5	5	29	4	6																					
0950-0956	087°/ 0.5	087°/10.0	3	10	40	15	13	13	12	6	6	10															
1006-1010	108°/10.0	108°/16.0										10	13	10	11	9	8	6									
1010-1021	104°/16.0	104°/ 0.5	1	1	9	9	25	28	16	11	6	10	9	9	8	8	8	5									
1021-1025	104°/ 0.5	104°/ 7.0	0	2	6	10	8	6	6																		
1025-1029	104°/ 7.0	104°/ 0.5	0	1	7	8	19	10	6																		
1029-1033	087°/ 0.5	087°/ 7.0	0	0	2	9	20	6	3																		
1033-1037	087°/ 7.0	087°/ 0.5	1	2	3	9	15	5	11																		
1037-1041	104°/ 0.5	104°/ 7.0	0	0	79	85	32	21	25																		
1041-1046	104°/ 7.0	104°/ 0.5	18	68	29	18	25	26	16																		
1046-1055	104°/ 0.5	104°/16.0	3	4	11	34	19	15	11	13	12	10	8	6	6	13	5	4									
1055-1107	104°/16.0	104°/ 0.5	5	103	8	9	18	19	10	4	5	9	8	6	5	6	4	4									
1107-1111	104°/ 0.5	104°/ 7.0	2	4	19	23	19	4	9																		
1111-1115	104°/ 7.0	104°/ 0.5	11	11	16	11	5	4	8																		
1115-1118	104°/ 0.5	104°/ 4.0	1	5	19	24																					
1118-1120	104°/ 4.0	104°/ 0.5	28	16	13	6																					
Conemaugh Plume 19 May 1971																											
0617-0623	054°/ 0.5	054°/10.0	18	10	60	10	15	14	28	4	4	3															
0623-0633	054°/11.0	064°/25.0											1	2	3	6	2	3	2	19	103	164	15	9	8	4	4
0633-0636	064°/25.0	062°/22.0																						13	11	14	0
0640-0655	062°/22.0	062°/10.0										0	0	0	0	0	0	0	0	0	1	3	3	8			
0723-0728	059°/10.0	059°/ 0.5	20	21	13	10	9	9	8	5	3	3															

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
			Conemaugh Plume 20 May 1971																								
0832-0836	206°/10.0	206°/ 0.5	0	0	0	0	0	0	0	0	0	0															
1018-1020	070°/ 4.0	070°/ 0.5	10	6	3	4																					
1020-1028	062°/ 0.5	062°/14.0	3	10	6	4	16	31	31	9	9	10	11	5	6	6											
1028-1034	062°/14.0	062°/ 0.5	8	15	6	3	13	26	30	28	15	9	8	7	7	6											
1034-1039	062°/ 0.5	062°/10.0	0	2	11	15	8	3	4	16	24	20															
1048-1053	073°/10.0	073°/ 0.5	1	16	15	20	21	11	20	13	14	21															
1053-1106	082°/ 0.5	082°/26.0	0	5	13	19	21	26	19	15	11	8	13	13	21	31	30	28	30	28	25	23	20	19	18	1.	14*
1106-1121	082°/26.0	082°/ 0.5	8	13	28	18	28	39	19	16	8	6	5	5	9	19	14	14	19	15	16	17	16	16	14	14	14*
			Conemaugh Plume 18 October 1971																								
0630-0641	323°/ 0.5	323°/18.0	0	0	32	21	2	1	2	1	2	2	1	1	1	1	2	5	3	4							
0641-0655	323°/18.0	323°/ 0.5	0	1	4	1	1	2	3	4	3	4	2	2	2	3	5	6	5	4							
0802-0808	323°/10.0	323°/ 0.5	0	2	0	0	0	1	2	3	4	4															
0819-0828	329°/ 0.5	329°/20.0	0	0	0	0	1	1	0	1	3	4	5	6	5	0	0	0	0	0	0	0					
0949-1001	329°/ 0.5	329°/24.0	0	1	1	1	0	0	2	3	5	6	4	5	5	5	5	9	2	3	4	4	4	5	4	4	
1001-1010	329°/24.0	329°/10.0										4	6	7	6	5	5	5	6	4	4	4	4	6	4	5	
1015-1018	331°/10.0	331°/ 4.0				6	7	5	6	6	7	5															
1023-1025	313°/ 4.0	313°/ 0.5	0	6	9	10																					
1025-1037	329°/ 0.5	329°/22.0	0	0	4	5	5	3	4	1	1	0	0	2	1	1	1	1	2	2	1	2	2	2			
1037-1051	329°/22.0	329°/ 0.5	22	29	18	6	5	4	5	3	2	3	4	2	1	1	1	1	2	1	1	1	1	2			
1051-1058	313°/ 0.5	313°/10.0	0	7	30	31	10	11	14	11	9	9															
1058-1103	313°/10.0	313°/ 0.5	5	14	25	32	11	12	12	6	6	7															
1115-1123	313°/ 0.5	313°/16.0	0	1	6	7	6	9	18	20	13	12	12	6	5	6	6	6									
1123-1132	313°/16.0	313°/ 0.5	1	17	10	6	9	8	15	16	12	12	9	5	6	6	7	6									
1132-1143	317°/ 0.5	317°/20.0	1	0	1	3	12	11	12	7	10	11	12	10	9	6	5	5	5	5	5	4					
			Conemaugh Plume 19 October 1971																								
0620-0630	310°/16.0	310°/ 0.5	2	1	2	1	2	2	2	2	4	5	7	9	6	5	1	0									
0806-0815	310°/16.0	310°/ 0.5	4	3	1	0	1	1	1	3	5	5	5	2	0	0	0	0									
0941-0947	315°/ 0.5	315°/10.0	11	19	26	16	5	10	6	18	20	19															
0952-0956	315°/10.0	315°/16.0										22	23	28	26	25	6	2									
1003-1011	310°/16.0	310°/ 4.0				22	34	18	5	5	4	5	4	5	7	6	6	5									
1015-1017	315°/ 4.0	315°/ 0.5	9	29	22	22																					
1017-1033	310°/ 0.5	310°/28.0	6	9	20	26	22	21	21	24	24	9	15	17	17	22	9	7	6	6	6	7	7	7	6	6	6*
1033-1049	310°/28.0	310°/ 0.5	4	14	20	21	16	20	30	26	19	17	19	26	22	26	24	14	11	12	11	9	7	8	7	7	7*

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 19 October 1971 (continued)																											
1049-1057	310°/ 0.5	310°/12.0	3	4	9	14	20	38	37	29	22	12	24	24													
1057-1104	310°/12.0	310°/ 0.5	6	6	6	12	22	22	28	30	31	26	25	27													
1104-1107	310°/ 0.5	310°/ 5.0	9	9	9	26	28																				
1107-1110	310°/ 5.0	310°/ 0.5	5	5	24	17	18																				
1121-1129	310°/ 0.5	310°/16.0	5	6	6	9	15	12	20	17	17	14	15	16	18	20	21	16									
1328-1330	286°/ 0.5	286°/ 4.0	0	0	4	18																					
1334-1338	286°/ 4.0	286°/10.0				63	21	13	14	10	8	9															
1345-1348	286°/10.0	286°/16.0										6	5	5	7	8	8	9									
1354-1406	286°/16.0	286°/ 0.5	18	6	17	16	33	23	14	18	20	13	11	12	7	8	8	12									
1406-1412	286°/ 0.5	286°/ 8.0	0	9	21	16	16	21	16	15																	
Conemaugh Plume 20 October 1971																											
0703-0708	314°/10.0	314°/ 4.0				21	12	6	7	7	6	6															
0714-0717	314°/ 4.0	314°/ 0.5	48	35	20	17																					
0717-0724	314°/ 0.5	314°/10.0	14	42	24	16	15	11	11	11	10	9															
0724-0732	314°/10.0	314°/ 0.5	21	21	21	15	11	10	11	12	10	10															
0732-0735	314°/ 0.5	314°/ 4.0	10	20	19	12																					
0735-0738	314°/ 4.0	314°/ 0.5	11	12	13	12																					
0738-0741	314°/ 0.5	314°/ 4.0	19	16	12	5																					
0741-0744	314°/ 4.0	314°/ 0.5	15	15	9	7																					
0744-0747	314°/ 0.5	314°/ 4.0	17	14	12	5																					
0747-0750	314°/ 4.0	314°/ 0.5	41	24	6	5																					
0750-0753	314°/ 0.5	314°/ 4.0	15	21	16	11																					
0753-0756	314°/ 4.0	314°/ 0.5	35	24	12	7																					
0809-0820	314°/ 0.5	314°/16.5	19	35	2	5	7	7	7	6	1	0	0	0	1	2	4	3									
0924-0928	320°/10.0	320°/ 4.0				1	11	10	10	10	11	10															
0933-0936	308°/ 4.0	308°/ 0.5	3	6	9	7																					
0936-0938	308°/ 0.5	308°/ 4.0	2	2	6	6																					
0938-0941	308°/ 4.0	308°/ 0.5	23	24	9	15																					
1028-1030	308°/ 4.0	308°/ 0.5	0	0	3	6																					
1030-1037	314°/ 0.5	314°/10.0	0	0	5	3	10	9	3	5	5	1															
1037-1044	314°/10.0	314°/ 0.5	1	17	4	3	4	7	9	4	5	1															

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 21 October 1971																											
0815-0831	354°/27.5	354°/ 0.5	0	0	0	0	0	0	1	1	2	3	5	6	6	6	6	4	2	4	3	3	9	27	25	24	14*
0842-0901	358°/ 0.5	358°/32.0	0	0	0	0	0	0	0	1	2	2	2	5	7	9	10	8	7	6	5	4	2	1	1	2	1*
0901-0914	358°/32.0	358°/10.0										10	10	10	9	11	11	6	7	7	6	6	6	5	2	6	5*
0914-0918	358°/10.0	358°/16.0										14	11	9	10	10	9	7									
0924-0928	358°/16.0	358°/10.0										5	3	4	3	1	5	5									
0932-0935	338°/10.0	338°/ 6.0						7	10	20	28	30															
0935-0943	338°/ 6.0	338°/20.0						6	7	9	12	15	20	19	20	22	24	24	21	9	4	3					
0943-0955	338°/20.0	338°/ 0.5	5	11	17	16	9	9	4	5	10	11	11	12	11	11	11	15	15	14	3	1					
1007-1013	343°/ 0.5	343°/12.0	0	3	12	48	62	48	42	53	35	35	19	10													
1013-1020	343°/12.0	343°/ 0.5	5	11	30	68	70	37	36	33	30	19	14	10													
1020-1033	343°/ 0.5	343°/24.0	3	7	11	34	72	55	35	31	40	44	33	22	10	9	7	6	7	7	12	11	9	9	9	10	
Conemaugh Plume 22 October 1971																											
0802-0809	360°/10.0	360°/ 0.5	0	10	12	14	2	0	0	2	9	10															
0819-0832	360°/ 0.5	360°/25.0	0	4	7	5	5	7	5	5	4	5	7	6	1	0	0	0	0	0	0	0	0	1	1	0	0
0913-0923	360°/25.0	360°/10.0										5	3	3	2	1	2	2	2	1	1	1	1	0	0	0	0
0929-0933	360°/10.0	360°/ 4.0				4	4	5	6	6	6	9															
0941-0943	015°/ 4.0	015°/ 0.5	0	0	0	13																					
0956-0959	360°/ 0.5	360°/ 4.0	0	0	0	0																					
1002-1004	015°/ 4.0	015°/ 1.5		0	4	5																					
1004-1010	015°/ 1.5	015°/10.0		0	0	1	5	36	21	1	1	0															
1015-1022	360°/10.0	360°/ 0.5	1	8	5	1	6	5	6	10	12	14															
1022-1028	344°/ 0.5	344°/10.0	0	0	0	4	3	1	1	0	1	0															
1031-1035	360°/10.0	360°/ 6.0						1	5	10	12	7															
1035-1038	360°/ 6.0	360°/10.0						1	0	1	6	7															
1041-1048	360°/10.0	360°/ 0.5	0	1	2	2	2	5	4	5	10	7															
1059-1114	360°/ 0.5	360°/25.0	0	0	0	1	0	0	0	0	0	7	7	10	11	11	7	7	9	6	6	7	6	7	6	6	5
Conemaugh Plume 2 November 1971																											
0724-0732	045°/ 4.0	045°/22.0				0	0	0	7	10	12	11	10	9	6	9	5	5	5	5	4	3	3	3			
0742-0757	050°/22.0	050°/ 0.5	6	46	16	15	15	17	9	11	11	10	7	7	7	7	7	6	5	5	5	4	4	3			
0911-0922	050°/ 0.5	050°/24.0	0	0	0	3	1	0	2	3	1	3	4	4	4	4	4	6	5	6	6	5	4	4	4	3	

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 3 November 1971																											
0958-1000	062°/ 4.0	062°/ 0.5	1	1	1	1																					
1000-1005	062°/ 0.5	062°/10.0	0	1	1	2	10	11	15	36	35	11															
1014-1021	081°/10.0	081°/ 0.5	5	1	0	0	2	3	20	21	15	22															
1039-1048	081°/ 0.5	081°/18.0	0	0	0	1	6	30	48	17	15	16	17	9	12	7	6	7	10	10							
1239-1241	081°/ 4.0	081°/ 0.5	3	4	34	65																					
1241-1246	081°/ 0.5	081°/10.0	0	0	3	2	3	4	2	0	0	0															
1252-1300	090°/10.0	090°/ 0.5	0	3	14	13	14	8	8	5	5	10															
1300-1310	090°/ 0.5	090°/20.0	0	0	0	0	0	1	3	6	5	5	5	8	6	4	5	8	10	11	3	3					
1310-1323	090°/20.0	090°/ 4.0				0	0	0	0	4	10	3	5	5	6	6	6	6	6	5	4	3					
1326-1328	081°/ 4.0	081°/ 0.5	0	0	0	0																					
1328-1331	081°/ 0.5	081°/ 6.0	0	0	0	0	0	0																			
1331-1335	081°/ 6.0	081°/ 0.5	0	0	0	0	1	0																			
Conemaugh Plume 4 November 1971																											
0750-0754	092°/ 4.0	092°/10.0				5	2	5	9	15	27	10															
0758-0801	092°/10.0	092°/16.0										7	10	10	11	10	7	6									
0801-0813	092°/16.0	092°/ 0.5	1	12	37	37	29	30	43	7	12	15	10	7	7	7	7	7									
Conemaugh Plume 5 November 1971																											
0715-0726	062°/ 0.5	062°/18.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
0726-0734	062°/18.0	062°/ 6.0						0	0	0	0	0	0	0	0	0	0	0	0	0							
1022-1039	036°/ 0.5	036°/30.0	0	0	0	2	10	20	31	35	24	20	21	21	18	14	13	9	3	3	1	4	8	8	6	10	1*
1039-1051	036°/30.0	036°/10.0										23	24	18	16	15	6	3	1	0	4	0	0	2	4	9	8*
1057-1103	030°/10.0	030°/ 0.5	0	0	9	14	11	4	11	11	12	12															
1103-1121	036°/ 0.5	036°/30.0	1	0	0	3	7	5	5	3	5	4	7	9	7	7	11	15	9	19	31	20	20	19	18	19	15*
1121-1138	036°/30.0	036°/ 2.5			7	22	25	24	19	15	24	39	15	12	21	22	22	22	21	17	17	13	16	14	9	10	11*
1138-1144	036°/ 2.5	036°/13.0			7	4	9	36	24	27	26	16	20	34	21												
1144-1151	036°/13.0	036°/ 0.5	0	1	42	58	31	22	26	24	24	36	72	23	22												
Conemaugh Plume 6 November 1971																											
0809-0814	022°/10.0	022°/ 0.5	26	11	5	0	4	6	6	5	9	14															
1015-1024	035°/16.0	035°/ 0.5	9	12	12	6	12	14	11	5	4	14	19	22	20	20	15	5									
1039-1055	035°/ 0.5	035°/30.0	6	7	9	9	5	5	7	7	7	5	6	13	15	15	11	16	17	15	14	14	12	11	9	9	6*
1055-1106	035°/30.0	035°/10.0										12	11	9	6	9	9	10	10	11	14	14	14	13	12	14	12*

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Conemaugh Plume 6 November 1971 (continued)																											
1111-1116	032°/10.0	032°/ 0.5	2	6	7	9	7	14	13	14	14	7															
1143-1145	040°/ 4.0	040°/ 0.5	0	4	12	7																					
1158-1209	040°/ 0.5	040°/22.0	0	0	0	4	16	21	28	20	19	3	9	6	6	4	3	3	4	7	4	6	5	3			
Conemaugh Plume 9 November 1971																											
0706-0712	342°/10.0	342°/ 0.5	4	2	1	3	5	6	7	6	7	6															
0822-0828	348°/10.0	348°/ 0.5	1	0	0	0	1	2	4	5	6	5															
0839-0846	348°/ 0.5	348°/16.0	1	0	1	2	1	1	1	1	4	6	5	6	6	5	6	6									
1011-1018	348°/16.0	348°/ 4.0				12	10	4	2	4	5	5	6	6	8	9	10	10									
1023-1025	348°/ 4.0	348°/ 0.5	0	0	0	6																					
1037-1043	017°/ 0.5	017°/10.0	0	0	28	38	11	10	15	1	0	1															
1047-1050	355°/10.0	355°/ 6.0						0	0	4	5	6															
1050-1057	355°/ 6.0	355°/18.0						0	0	0	0	2	4	5	5	5	6	5	5	4							
1057-1105	355°/18.0	355°/ 3.5				0	0	0	0	0	0	5	5	5	6	6	5	5	4	4							
1158-1200	047°/ 4.0	047°/ 0.5	2	12	0	0																					
Conemaugh Plume 12 November 1971																											
0735-0742	066°/ 4.0	066°/16.0				1	0	1	1	0	0	1	14	5	4	0	1	0									
0742-0746	066°/16.0	066°/10.0										1	1	0	0	0	0	0									
0840-0849	066°/16.0	066°/ 0.5	0	0	0	0	0	0	0	0	0	1	9	2	4	8	9	8									
1039-1046	066°/ 0.5	066°/16.0	1	1	4	8	29	29	48	45	18	5	0	1	0	1	1	0									
1051-1055	077°/16.0	077°/10.0										6	7	8	9	11	18	19									
1059-1106	077°/10.0	077°/ 0.5	1	0	35	40	3	4	13	18	10	15															
Conemaugh Plume 13 November 1971																											
0834-0837	097°/10.0	097°/16.0										13	16	14	9	9	10	10									
0837-0849	097°/16.0	097°/ 0.5	3	9	25	6	8	24	26	14	5	4	8	8	10	11	14	11									
1001-1009	091°/ 0.5	091°/16.0	1	1	1	1	0	1	1	0	9	21	35	4	0	2	1	2									
1009-1018	091°/16.0	091°/ 0.5	1	0	0	0	2	1	0	11	5	11	19	6	0	1	4	1									
Keystone Plume 16 November 1971																											
1008-1014	161°/10.0	161°/ 0.5	0	0	0	0	0	0	0	0	0	0															
1215-1224	178°/16.0	178°/ 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1									

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
			Conemaugh Plume 17 November 1971																								
0803-0805	352°/10.0	352°/16.0										6	6	7	1	1	1	0									
0805-0812	352°/16.0	352°/ 1.5		9	10	26	22	11	9	7	6	5	1	1	1	0	0	0									
0812-0816	352°/ 1.5	352°/10.0		30	55	38	21	26	24	12	14	7															
0831-0833	068°/10.0	068°/16.0										1	1	1	0	0	0	0									
0833-0835	068°/16.0	068°/10.0										0	0	0	0	0	0	0									
0945-0958	352°/25.0	352°/ 1.5		1	1	2	1	1	2	1	1	1	1	0	0	0	0	1	1	1	0	2	1	1	1	1	1
1111-1115	022°/10.0	022°/20.0										5	4	4	3	1	0	0	0	0	1	0					
1115-1123	022°/20.0	022°/ 0.5	9	28	54	29	15	15	10	4	3	0	0	1	1	0	3	1	2	0	0	0					
1135-1153	028°/ 0.5	028°/34.0	10	16	24	65	44	24	23	13	1	0	1	3	4	16	35	33	67	34	13	11	8	14	11	19	23*
1153-1210	028°/34.0	028°/ 0.5	14	36	37	37	64	60	38	46	23	11	8	6	9	5	16	29	41	26	33	29	23	16	21	23	26*
1345-1350	036°/10.0	036°/ 0.5	3	5	21	36	28	20	16	19	15	10															
1402-1417	036°/ 0.5	036°/30.0	0	0	0	9	14	5	5	5	5	8	17	19	20	16	16	21	24	25	21	25	24	16	16	13	11*
1417-1432	036°/30.0	036°/ 0.5	0	3	10	28	6	5	3	2	1	1	3	6	10	8	9	14	30	33	28	24	25	20	15	13	11*
1432-1451	036°/ 0.5	036°/34.0	0	0	6	20	20	8	4	4	5	6	11	20	6	6	7	13	20	20	26	26	30	20	21	20	18*
1451-1459	036°/34.0	036°/22.0																						19	19	24	31*
1512-1521	036°/22.0	036°/38.0																						27	25	24	16*
1521-1545	036°/38.0	036°/ 0.5	0	0	0	0	1	5	3	8	10	10	11	18	20	20	21	29	30	29	30	23	20	25	26	23	21*

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Begin	End	Distance downwind from plant, km																								
			26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Conemaugh Plume 10 May 1971																											
0853-0915	227°/ 0.5	227°/40.0	*21	33	22	20	22	26	32	32	30	29	19	12	9	11	10										
0915-0928	227°/40.0	227°/20.0	*31	32	38	27	27	17	17	17	15	12	12	7	10	9	7										
0928-0940	227°/20.0	227°/40.0	*17	20	22	22	24	20	19	15	15	14	11	10	12	9	8										
0940-1006	227°/40.0	227°/ 0.5	*14	12	17	15	16	16	16	16	14	13	11	10	11	10	8										
Conemaugh Plume 11 May 1971																											
0828-0845	327°/ 0.5	327°/28.0	*11	12	12																						
0845-0906	327°/28.0	327°/ 0.5	*12	12	10																						
Conemaugh Plume 15 May 1971																											
0649-0703	002°/ 4.0	002°/28.0	*5	4	5																						
0703-0721	353°/28.0	353°/ 0.5	*6	5	4																						
0734-0748	353°/ 0.5	353°/28.0	*11	15	16																						
0822-0833	353°/28.0	353°/10.0	*13	14	9																						
0840-0849	002°/10.0	002°/26.0	*0																								
0849-0910	002°/26.0	002°/ 0.5	*4																								
Conemaugh Plume 20 May 1971																											
1053-1106	082°/ 0.5	082°/26.0	*14																								
1106-1121	082°/26.0	082°/ 0.5	*13																								
Conemaugh Plume 19 October 1971																											
1017-1033	310°/ 0.5	310°/28.0	*6	6	6																						
1033-1049	310°/28.0	310°/ 0.5	*7	6	6																						
Conemaugh Plume 21 October 1971																											
0815-0831	354°/27.5	354°/ 0.5	*9	2																							
0842-0901	358°/ 0.5	358°/32.0	*0	2	4	5	6	2	0																		
0901-0914	358°/32.0	358°/10.0	*6	7	6	6	5	1	0																		

Table 4. (continued) PEAK GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

			Distance downwind from plant, km																								
EST	Begin	End	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Conemaugh Plume 5 November 1971																											
1022-1039	036°/ 0.5	036°/30.0	*4	4	6	6	4																				
1039-1051	036°/30.0	036°/10.0	*9	4	6	5	3																				
1103-1121	036°/ 0.5	036°/30.0	*11	10	9	6	6																				
1121-1138	036°/30.0	036°/ 2.5	*5	9	5	6	6																				
Conemaugh Plume 6 November 1971																											
1039-1055	035°/ 0.5	035°/30.0	*5	5	7	6	7																				
1055-1106	035°/30.0	035°/10.0	*7	7	6	7	7																				
Conemaugh Plume 17 November 1971																											
1135-1153	028°/ 0.5	028°/34.0	*24	14	11	3	3	4	6	6	4																
1153-1210	028°/34.0	028°/ 0.5	*22	19	11	4	4	6	6	5	6																
1402-1417	036°/ 0.5	036°/30.0	*6	5	4	1	0																				
1417-1432	036°/30.0	036°/ 0.5	*8	4	0	1	0																				
1432-1451	036°/ 0.5	036°/34.0	*18	16	16	15	15	11	5	3	0																
1451-1459	036°/34.0	036°/22.0	*25	25	15	15	15	9	1	1	0																
1512-1521	036°/22.0	036°/38.0	*15	18	19	18	19	18	19	18	15	15	14	8	8												
1521-1545	036°/38.0	036°/ 0.5	*18	20	22	21	21	20	21	18	18	13	9	9	8												

Table 5. INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER

Legend

EST : Time of beginning and end of each flight.

Origin : Location of rectangular origin in whole degrees of azimuth and kilometers to nearest tenth from Conemaugh or Keystone stacks.

Dir : +y indicates counterclockwise direction around stacks from origin; -y indicates clockwise direction.

Distance, etc. : Cumulative distance across plume from origin in whole meters. Thousands digit is not indicated.

SO_2, pphm : Instantaneous SO_2 concentration per 6-second flight interval in whole parts per hundred million by volume.

* : Indicates that SO_2 concentrations beyond 3353 meters are continued on last page of table.

Table 5. INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m																									
			0	134	268	402	536	671	805	939	073	207	341	475	609	743	877	012	146	280	414	548	682	816	950	084	218	353
Conemaugh Plume 21 April 1971																												
1002-1007	109°/16.0	+y	25	23	25	24	23	23	22	18	14	16	14	15	15	14	11	9	8	6	5	4	4	3	3	3	2	3*
		-y	25	24	19	13	13	11	9	10	7	6	9	9	14	11	10	9	11	4	4	2	2	1	1	0		
1017-1019	107°/10.0	+y	8	16	13	13	12	11	10	9	3	3	8	2	1	1	1	4	0									
		-y	8	12	6	4	3	3	2	0																		
1110-1111	107°/16.0	+y	0	1	3	4	1	0																				
1120-1126	089°/10.0	-y	14	13	13	14	14	13	13	14	15	16	18	17	14	9	10	10	9	8	6	8	9	9	8	7	2	2*
		+y	14	14	14	16	18	18	19	19	20	16	22	11	11	11	10	9	8	7	8	8	9	9	8	7	6	6*
Conemaugh Plume 22 April 1971																												
0719-0720	099°/ 4.0	+y	10	5	3	0																						
		-y	10	6	5	2	4	0																				
0758-0800	112°/16.0	+y	7	7	7	9	8	4	2	1	0																	
		-y	7	5	5	5	4	4	2	9	2	2	5	1	0													
0827-0828	099°/ 4.0	+y	7	6	1	0																						
		-y	7	10	2	0																						
Conemaugh Plume 23 April 1971																												
0748-0751	122°/10.0	+y	23	18	23	21	18	19	21	24	15	14	13	11	8	6	5	5	5	5	3	0						
		-y	23	18	19	14	15	15	25	10	20	4	1	0														
0801-0804	124°/16.0	-y	10	10	10	11	10	10	10	9	9	7	8	4	0													
		+y	10	10	10	10	10	10	10	9	7	5	4	4	4	5	3	0										
1024-1026	113°/10.0	+y	5	3	4	3	3	2	0																			
		-y	5	5	5	14	16	15	13	5	3	3	2	1	0													
Conemaugh Plume 26 April 1971																												
0635-0636	090°/ 4.0	+y	1	1	2	3	2	1	0																			
		-y	1	0																								
0745-0747	108°/10.0	+y	5	4	4	4	3	3	3	2	2	1	1	0														
		-y	5	6	6	6	4	3	3	2	1	0																
0931-0933	106°/16.0	+y	6	6	6	3	0																					
		-y	6	6	7	5	3	2	1	1	0																	
0943-0945	108°/10.0	+y	5	6	4	4	3	4	6	4	4	4	2	0														
		-y	5	4	4	3	3	1	5	4	4	3	0															

Table 5. (continued) INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m																									
			0	134	268	402	536	671	805	939	073	207	341	475	609	743	877	012	146	280	414	548	682	816	950	084	218	353
Conemaugh Plume 26 April 1971 (continued)																												
0952-0953	102°/ 4.0	-y	106	9	1	0																						
		+y	106	38	9	0																						
Conemaugh Plume 28 April 1971																												
0627-0628	343°/ 4.0	+y	1	0																								
		-y	1	3	2	0																						
Conemaugh Plume 4 May 1971																												
0621-0622	090°/ 4.0	+y	0	0	0	0	0	0	0	0	0																	
		-y	0	0	0	0	0	0	0	0	0																	
0718-0720	109°/10.0	-y	11	12	9	9	5	7	5	4	1	4	0															
		+y	11	7	6	6	6	7	5	5	4	3	0															
0903-0904	109°/ 4.0	+y	2	4	5	4	3	1	0																			
		-y	2	0	1	0																						
0915-0917	101°/10.0	+y	11	10	10	10	9	8	6	5	5	2	0	1	3	1	1	0										
		-y	11	10	10	10	10	11	12	7	6	7	2	1	0													
0941-0945	109°/16.0	+y	4	4	5	4	4	5	5	6	6	5	5	5	3	3	2	1	1	1	0							
		-y	4	4	5	6	5	5	5	6	6	5	6	5	5	5	5	3	3	3	4	3	3	3	3	4	3	3*
Conemaugh Plume 5 May 1971																												
0652-0654	038°/10.0	-y	16	12	9	4	3	1	0																			
		+y	16	17	16	14	14	10	8	6	5	4	3	3	3	3	0											
0843-0847	047°/22.0	+y	11	11	11	9	7	5	5	4	4	4	4	3	2	3	1	0										
		-y	11	10	10	10	9	9	9	8	7	6	6	6	6	6	5	5	5	5	5	5	5	4	4	3	2	0
Conemaugh Plume 7 May 1971																												
0641-0644	273°/12.0	-y	28	25	29	40	75	7	22	26	25	36	22	96	39	0												
		+y	28	17	7	7	5	4	4	6	7	3	1	1	10	3	8	3	0									
0802-0806	277°/11.0	-y	0	0	1	1	2	4	4	1	0	0	0	0	1	4	1	5	1	1	0							
		+y	0	0	2	0	0	1	1	1	1	0	1	3	1	4	5	2	2	0								
1102-1104	313°/ 4.0	+y	15	14	11	13	4	2	0																			
		-y	15	10	10	8	4	3	3	2	2	0																

Table 5. (continued) INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m																									
			0	134	268	402	536	671	805	939	073	207	341	475	609	743	877	012	146	280	414	548	682	816	950	084	218	353
			Conemaugh Plume 10 May 1971																									
1028-1032	211°/ 4.0	-y	23	28	25	19	20	25	8	6	5	3	5	6	5	5	4	4	4	3	2	3	1	0				
		+y	23	11	16	18	14	9	9	8	5	4	5	3	3	1	0											
			Conemaugh Plume 11 May 1971																									
0725-0728	339°/16.0	+y	14	13	12	11	11	10	10	9	8	6	5	5	4	4	4	3	3	2	0							
		-y	14	15	16	14	15	14	14	13	13	10	9	8	7	4	3	2	1	0								
0914-0916	327°/10.0	-y	25	33	20	19	30	16	8	9	10	11	10	14	10	8	5	4	0									
		+y	25	26	23	11	11	10	5	4	3	1	0															
0924-0925	327°/ 4.0	-y	5	4	3	0																						
		+y	5	5	5	3	0																					
			Conemaugh Plume 14 May 1971																									
0644-0648	047°/22.0	-y	11	11	11	11	10	10	10	9	9	9	9	8	8	7	6	7	9	6	6	5	4	4	2	0		
		+y	11	12	11	11	13	13	12	11	10	9	9	6	5	3	2	1	1	0								
0730-0734	055°/22.0	+y	5	5	5	5	5	5	6	6	6	6	7	8	8	8	8	8	8	9	8	7	6	5	4	3	2	2*
0834-0836	066°/22.0	+y	3	3	4	4	3	4	2	2	1	1	0															
		-y	3	4	4	4	4	4	4	3	4	3	2	1	0													
0848-0851	090°/10.0	+y	20	19	14	10	9	9	6	6	5	7	7	5	5	5	4	4	3	1	0							
		-y	20	21	23	20	21	15	11	8	5	5	5	4	5	5	5	4	4	2	0							
0939-0940	068°/ 4.0	-y	15	6	1	0																						
		+y	15	65	16	9	4	0																				
1001-1008	082°/ 7.5	-y	8	16	20	15	14	18	23	21	18	15	11	10	13	11	10	14	17	16	14	15	16	16	16	15	14	10*
		+y	8	6	10	6	7	8	5	5	6	6	8	10	10	11	11	8	10	9	4	5	10	16	18	11	10	10*
			Above ground-level flight was made through Conemaugh Gorge.																									
1236-1238	090°/10.0	+y	8	10	15	19	8	5	3	2	0																	
		-y	8	9	9	8	8	7	8	5	5	4	4	4	3	0												
			Conemaugh Plume 15 May 1971																									
0626-0630	002°/10.0	+y	11	11	12	11	12	12	10	13	15	16	16	15	13	11	7	9	11	16	10	5	4	3	0			
		-y	11	14	21	21	22	24	17	19	19	28	24	20	25	10	9	9	7	7	6	4	0					
0645-0648	002°/ 4.0	+y	11	9	7	6	9	8	10	7	5	3	3	0														
		-y	11	11	11	7	10	11	12	13	15	14	19	24	19	19												
0836-0839	002°/10.0	+y	16	20	34	29	20	20	24	19	29	19	16	13	7	6	6	5	4	3	0							
		-y	16	15	14	15	18	15	11	10	9	8	6	6	5	4	0											

Table 5. (continued) INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m 0	134	268	402	536	671	805	939	073	207	341	475	609	743	877	012	146	280	414	548	682	816	950	084	218	353
Conemaugh Plume 17 May 1971																												
0945-0946	087°/ 4.0	+y	12	14	5	6	11	6	0																			
		-y	12	21	16	14	5	4	0																			
0957-1003	108°/10.0	+y	15	15	14	14	13	13	13	10	9	8	6	8	7	6	6	6	6	5	5	5	4	4	3	4	4	5*
		-y	15	15	10	9	9	11	9	10	10	12	15	14	14	13	10	8	10	10	9	9	9	10	8	8	4	8*
Conemaugh Plume 19 May 1971																												
0643-0646	062°/22.0	+y	5	4	3	3	6	8	10	11	10	10	9	8	4	5	5	5	5	3	0							
		-y	5	5	6	8	10	9	9	9	9	9	9	9	10	13	8	6	7	5	0							
Conemaugh Plume 20 May 1971																												
1016-1017	070°/ 4.0	+y	4	1	1	0																						
		-y	4	6	5	4	3	2	1	0																		
1043-1046	073°/10.0	-y	19	20	20	28	21	21	16	6	4	4	5	4	3	0												
		+y	19	16	24	16	16	17	20	20	19	15	6	5	4	1	0											
Conemaugh Plume 18 October 1971																												
1012-1014	331°/10.0	+y	7	6	4	1	1	1	1	1	0																	
		-y	7	6	6	6	6	3	3	1	1	0																
1020-1022	313°/ 4.0	-y	9	5	3	2	1	1	0																			
		+y	9	10	10	9	7	5	4	1	1	0																
Conemaugh Plume 19 October 1971																												
0949-0951	315°/10.0	+y	15	15	14	9	12	9	7	5	3	4	3	1	0													
		-y	15	17	18	21	12	7	5	3	2	1	0															
1000-1002	310°/16.0	-y	7	6	5	1	1	0																				
		+y	7	8	6	5	5	5	5	5	4	3	2	2	1	0												
1013-1014	315°/ 4.0	-y	16	16	4	3	2	0																				
		+y	16	17	9	5	3	5	5	4	4	4	3	0														
1332-1333	286°/ 4.0	-y	31	15	11	0																						
		+y	31	49	5	4	4	2	2	3	2	0																
1339-1342	286°/10.0	+y	5	5	6	5	6	4	3	2	4	1	0	1	1	0												
		-y	5	5	5	5	4	4	5	5	4	4	4	3	2	3	3	2	1	0								

Table 5. (continued) INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m																									
			0	134	268	402	536	671	805	939	073	207	341	475	609	743	877	012	146	280	414	548	682	816	950	084	218	353
Conemaugh Plume 19 October 1971 (continued)																												
1350-1352	286°/16.0	-y	5	6	6	6	3	4	4	4	2	1	0															
		+y	5	5	6	6	7	8	5	5	3	4	4	3	2	0												
Conemaugh Plume 20 October 1971																												
0659-0701	314°/10.0	+y	5	4	3	1	1	0																				
		-y	5	5	6	5	5	5	4	2	2	1	0															
0711-0713	314°/ 4.0	+y	16	15	17	10	10	9	9	9	7	5	5	5	1	0												
		-y	16	11	6	5	6	5	2	1	0																	
0920-0922	320°/10.0	-y	8	9	9	9	9	9	9	9	3	0																
		+y	8	8	7	7	7	6	6	6	5	4	5	4	1	0												
0928-0929	308°/ 4.0	-y	12	15	10	6	1	1	0																			
		+y	12	9	10	16	21	7	9	5	4	1	0															
0930-0931	308°/ 4.0	+y	8	5	4	4	4	1	0																			
		-y	8	16	11	10	9	5	4	1	0																	
Conemaugh Plume 21 October 1971																												
0918-0921	358°/16.0	+y	5	5	6	6	6	6	6	5	6	7	6	5	6	6	8	9	10	10	10	10	10	10	10	9	9	9*
0921-0924	358°/16.0	+y	5	6	6	6	6	6	6	6	5	6	6	6	7	9	11	11	14	12	12	10	10	9	9	13	10	9*
0928-0930	338°/10.0	-y	10	11	7	7	6	7	7	11	10	10	9	9	6	4	4	1	3	1	0							
		+y	10	19	16	8	1	0																				
Conemaugh Plume 22 October 1971																												
0759-0801	360°/10.0	+y	9	7	5	1	1	0																				
		-y	9	9	7	6	6	7	6	4	4	2	1	1	1	0												
0925-0927	360°/10.0	-y	5	7	5	5	2	2	2	1	0																	
		+y	5	5	4	4	6	6	7	7	7	6	4	2	0													
0936-0937	015°/ 4.0	+y	4	17	0	0	0	1	2	2	2	1	1	0														
0937-0938	015°/ 4.0	+y	4	35	56	9	1	1	2	1	2	4																
0938-0940	015°/ 4.0	+y	2	0	1	1	2	1	4	3	1	0																
		-y	2	15	17	27	20	7	9	2	1	0																
1000-1001	015°/ 4.0	+y	3	6	1	0																						
		-y	3	2	5	6	2	1	0	1	0																	
1011-1013	360°/10.0	-y	12	10	7	7	6	5	2	1	0																	
		+y	12	11	10	12	7	9	4	2	2	1	1	0														

Table 5. (continued) INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m																									
			0	134	268	402	536	671	805	939	073	207	341	475	609	743	877	012	146	280	414	548	682	816	950	084	218	353
Conemaugh Plume 2 November 1971																												
0722-0723	045°/ 4.0	-y	0	0	0	0	0																					
		+y	0	0	0	0	0	0																				
0737-0739	050°/22.0	+y	2	2	1	1	1	1	1	1	1	1	0															
		-y	2	2	2	2	2	2	2	2	2	2	1	1	1	0												
Conemaugh Plume 3 November 1971																												
0956-0957	062°/ 4.0	-y	1	0																								
		+y	1	35	11	4	4	2	1	0																		
1007-1012	081°/10.0	+y	2	4	4	2	2	3	5	5	6	12	25	21	20	25	15	17	12	12	9	9	9	9	10	9	4	4*
		-y	2	4	3	5	3	5	5	10	15	22	17	19	16	17	16	15	9	5	4	4	4	4				
1237-1238	081°/ 4.0	+y	46	0																								
		-y	46	8	1	1	3	1	1	0																		
1249-1251	090°/10.0	+y	6	5	1	1	1	1	3	0																		
		-y	6	6	18	5	4	3	3	3	3	2	2	3	3	1	0											
1324-1325	081°/ 4.0	-y	3	0																								
		+y	3	2	0																							
Conemaugh Plume 4 November 1971																												
0748-0749	092°/ 4.0	-y	1	1	0																							
		+y	1	1	1	1	0																					
0755-0756	092°/10.0	+y	5	4	0																							
		-y	5	6	6	6	5	5	4	1	0																	
Conemaugh Plume 5 November 1971																												
1053-1055	030°/10.0	-y	14	15	11	9	5	2	1	1	0																	
		+y	14	15	18	17	15	9	6	2	3	4	4	4	5	5	1	1	0									
Conemaugh Plume 6 November 1971																												
0803-0806	022°/10.0	-y	6	5	5	5	4	5	1	1	0																	
		+y	6	6	7	10	8	6	5	6	6	7	7	5	6	3	4	4	4	2	2	0						
1012-1014	035°/16.0	+y	11	9	7	10	9	8	5	5	4	5	4	4	4	2	0											
		-y	11	7	6	2	2	2	4	0																		

Table 5. (continued) INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m																									
			0	134	268	402	536	671	805	939	073	207	341	475	609	743	877	012	146	280	414	548	682	816	950	084	218	353
			Conemaugh Plume 6 November 1971 (continued)																									
1106-1107	032°/10.0	-y	4	6	9	9	15	22	26	11	6	2	2	1	0													
1108-1110	032°/10.0	-y	15	1	1	1	0																					
		+y	15	11	10	8	6	7	6	6	5	4	4	4	2	0												
1141-1142	040°/ 4.0	-y	20	17	7	12	4	4	4	5																		
		+y	20	11	5	3	0																					
			Conemaugh Plume 9 November 1971																									
0818-0821	348°/10.0	-y	3	3	4	4	5	5	5	6	6	5	6	5	5	4	5	7	7	3	2	1	0					
		+y	3	4	5	5	4	3	1	1	0																	
1007-1009	348°/16.0	-y	6	5	4	4	4	3	1	1	1	1	0															
		+y	6	6	6	6	7	7	6	6	4	3	1	0														
1020-1022	348°/ 4.0	+y	3	4	4	2	5	1	1	2	1	0																
		-y	3	2	3	12	15	12	2	2	1	0																
1044-1046	355°/10.0	-y	4	4	2	3	1	1	1	2	1	1	1	0														
		+y	4	5	6	6	6	6	3	3	2	1	0															
			Conemaugh Plume 12 November 1971																									
0837-0839	066°/16.0	+y	8	9	8	6	5	4	4	3	2	1	1	1	1	0												
		-y	8	8	8	8	4	4	4	5	3	0																
1048-1050	077°/16.0	+y	16	14	13	8	3	1	1	1	0																	
		-y	16	16	18	15	16	9	8	5	3	2	0															
1056-1058	077°/10.0	+y	3	4	3	2	1	1	1	0																		
		-y	3	4	6	11	11	9	5	3	0																	
			Conemaugh Plume 13 November 1971																									
0830-0832	097°/10.0	-y	5	5	8	8	8	7	6	7	5	5	5	4	4	4	5	4	7	5	3	0						
		+y	5	4	4	4	3	1	0																			
			Keystone Plume 16 November 1971																									
1213-1214	178°/16.0	+y	1	1	1	1	1	1	0																			
		-y	1	1	1	1	0																					

Table 5. (continued) INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m 0	134	268	402	536	671	805	939	073	207	341	475	609	743	877	012	146	280	414	548	682	816	950	084	218	353
			Conemaugh Plume 17 November 1971																									
0759-0802	352°/10.0	-y	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	0	1	1	2	1	0			
		+y	1	1	1	6	6	2	2	2	2																	
0828-0829	068°/10.0	-y	1	1	1	0																						
		+y	1	2	1	1	0	1	0																			
1107-1109	022°/10.0	+y	2	3	1	1	1	1	1	1	1	2	1	3	3	2	1	0										
		-y	2	2	1	1	1	1	0																			
1337-1342	036°/10.0	+y	11	14	14	13	8	9	10	11	9	6	6	6	6	7	7	6	7	6	6	5	5	5	5	5	4	3*
		-y	11	12	11	11	10	10	11	11	11	11	10	11	5	5	4	4	3	3	3	3	5	3	3	3	0	
1502-1509	036°/22.0	+y	25	29	29	30	29	28	29	26	20	21	25	18	19	18	6	5	4	4	4	5	4	4	5	4	3	3*
		-y	25	29	21	16	13	13	13	13	13	14	14	14	14	14	14	14	13	13	14	13	13	12	10	6	4	5*

Table 5. (continued) INSTANTANEOUS GROUND-LEVEL SO_2 CONCENTRATIONS - HELICOPTER, pphm

EST	Origin	Dir	Distance across plume, m																									
			487	621	755	889	023	157	291	425	559	694	828	962	096	230	364	498	632	766	900	035	169	303	437	571	705	839
Conemaugh Plume 21 April 1971																												
1002-1007	109°/16.0	+y	*1	0																								
1120-1126	089°/10.0	-y	*0																									
		+y	*7	5	5	4	0																					
Conemaugh Plume 4 May 1971																												
0941-0945	109°/16.0	-y	*2	1	0																							
Conemaugh Plume 14 May 1971																												
0730-0734	055°/22.0	+y	*1	1	1	0																						
1001-1008	082°/ 7.5	-y	*5	4	3	4	4	6	4	5	6																	
		+y	*9	8	8	9	8	8	3	2	1	1																
			Above ground-level flight was made through Conemaugh Gorge																									
Conemaugh Plume 17 May 1971																												
0957-1003	108°/10.0	+y	*5	4	4	4	3	0																				
		-y	*8	3	4	4	3	3	1	0																		
Conemaugh Plume 21 October 1971																												
0918-0921	358°/16.0	+y	*7	6	6	11	15	11	7	8	9	7	3	0														
0921-0924	358°/16.0	+y	*9	7	5	3	1	0																				
Conemaugh Plume 3 November 1971																												
1007-1012	081°/10.0	+y	*2	2	1	1	2	2	2	2	2	1	0															
Conemaugh Plume 17 November 1971																												
1337-1342	036°/10.0	+y	*4	1	2	0																						
1502-1509	036°/22.0	+y	*4	3	2	3	3	2	1	0																		
		-y	*4	3	3	3	3	3	2	0																		

GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

The ground-level SO_2 concentrations measured by portable bubblers are summarized in Table 7. Data are arranged by series day with each bubbler heading containing its identification, coordinates, and height above or below the source generating station's stack-base elevation. Also included in the heading is a three-letter code describing the terrain, vegetation, and ground cover in the vicinity of the sampling site. Descriptions corresponding to this code are presented in Table 6.

Due to occasional bubbler malfunctions, some sampling periods may be shorter or longer than 30 minutes; this was considered in the reduction, and actual sampling times are listed as such. Caution should be exercised in interpreting the bubbler concentrations since no compensation was made for background SO_2 levels.

Table 6. BUBBLER SITE DESCRIPTION

Terrain

A - Ridgetop perpendicular to plume
B - Hillside perpendicular to plume - windward side
C - Hillside perpendicular to plume - leeward side
D - Valley floor perpendicular to plume
E - Ridgetop parallel to plume
F - Hillside parallel to plume
G - Valley floor parallel to plume
H - Flatland

Ground Cover

M - Clear - no trees
N - Trees overhead with leaves
O - Trees overhead without leaves
P - Tall grass or bushes - more than 8 inches high
Q - Short grass - less than 8 inches high
R - Dirt or sand
S - Rocks
T - Snow

Table 7. AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Legend

Bubbler heading : 1. Individual bubbler identification.
2. Height of bubbler sampling site above or below Conemaugh stack base elevation (SBE) in whole meters.
3. Description of terrain, vegetation, and ground-cover in vicinity of sampling site.
4. Location of bubbler in whole degrees of azimuth and kilometers to nearest tenth from Conemaugh stacks.

EST : Time of beginning and end of each sample.

pphm : Average SO_2 concentration during sampling period in whole parts per hundred million by volume.

: Missing data.

Table 7. AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 21 April 1971

G-20 5 SBE GMQ 343/0.8		G-25 65 SBE CMQ 103/9.1		G-6 135 SBE COQ 117/9.6		G-27 175 SBE AMQ 102/12.0		G-1 60 SBE CMQ 096/11.4		G-16 185 SBE BOQ 085/11.8		G-36 325 SBE EMQ 078/12.5		G-25 220 SBE FMQ 090/13.7		G-26 60 SBE CMQ 086/7.6		G-8 80 SBE CMQ 090/3.3	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0850-20	0	0910-40	7	0923-53	4	0941-11	9	0954-24	6	1003-33	10	1010-40	4	1031-01	2	1056-26	10	1110-40	4
0920-50	6	0940-10	4	0953-23	5	1011-41	6	1024-54	4	1033-03	5	1040-10	0	1101-31	0	1126-56	0	1140-10	4
0950-20	6	1010-40	6	1023-53	2	1041-11	4	1054-24	2	1103-33	13	1110-40	1	1131-01	7	1156-26	3	1210-40	2
1020-50	3	1040-10	4	1053-23	1	1111-41	4	1124-54	8	1133-03	7	1140-10	0	1201-31	0	1226-56	2	1240-10	1
1050-20	0	1110-40	11	1123-53	0	1141-11	0	1154-24	4	1203-33	6	1210-40	0	1231-01	0	1256-26	0	1310-40	0
1120-50	0	1140-10	0	1153-23	2	1211-41	10	1224-54	2	1233-03	4	1240-10	0	1301-31	0	1326-56	3	1340-10	0

Conemaugh Plume 23 April 1971

G-8 65 SBE CMQ 103/9.1		G-16 135 SBE COQ 117/9.6		G-26 175 SBE FMR 123/8.9		G-36 130 SBE COQ 129/9.7		G-6 195 SBE AMQ 122/10.7		G-1 140 SBE AMQ 118/11.8		G-35 175 SBE CMQ 124/13.5		G-20 155 SBE BOR 105/3.5		G-25 145 SBE BMQ 121/2.8		G-27 5 SBE GMQ 343/0.8	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0843-13	2	0857-27	10	0918-48	0	0927-57	1	0941-11	0	0958-28	1	1016-46	0	1053-23	0	1102-32	0	1116-46	2
0913-43	2	0927-57	5	0948-18	0	0957-27	2	1011-41	0	1028-58	3	1046-16	0	1123-53	0	1132-02	0	1146-16	3
0943-13	2	0957-27	3	1018-48	2	1027-57	2	1041-11	1	1058-28	2	1116-46	2	1153-23	14	1202-32	0	1216-46	0
1013-43	0	1027-57	3	1048-18	0	1057-27	1	1111-41	2	1128-58	4	1146-16	2	1223-53	8	1232-02	0	1246-16	0
1043-13	0	1057-27	3	1118-48	0	1127-57	3	1141-11	5	1158-28	4	1216-46	0	1253-23	6	1302-32	0	1316-46	1
1113-43	0	1127-57	6	1148-18	3	1157-27	3	1211-41	5	1228-58	3	1246-16	2	1323-53	10	1332-02	0	1346-16	1

Conemaugh Plume 24 April 1971

G-16 240 SBE EMQ 022/22.4		G-8 250 SBE EMQ 031/22.2		G-26 250 SBE EMQ 032/24.0		G-6 260 SBE EMQ 032/27.4	
EST	pphm	EST	pphm	EST	pphm	EST	pphm
0828-58	0	0835-05	1	0845-15	0	0858-28	1
0858-28	0	0905-35	2	0915-45	1	0928-58	1

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 26 April 1971

G-36 185 SBE BOQ 085/11.8		G-20 60 SBE CMQ 096/11.4		G-35 175 SBE AMQ 102/12.0		G-27 220 SBE FMQ 090/13.7		G-1 135 SBE COQ 117/9.6		G-26 65 SBE CMQ 103/9.1		G-8 60 SBE CMQ 086/7.6		G-6 40 SBE CMQ 077/3.3		G-25 80 SBE COQ 090/3.3		G-16 155 SBE BOR 105/3.3	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0750-20	2	0758-28	0	0807-37	4	0817-47	1	0842-12	1	0852-22	3	0900-30	3	0913-43	2	0918-48	1	0925-55	5
0820-50	0	0828-58	4	0837-07	0	0847-17	0	0912-42	1	0922-52	2	0930-00	2	0943-13	1	0948-18	0	0955-25	4
0850-20	0	0858-28	3	0907-37	2	0917-47	0	0942-12	0	0952-22	2	1000-30	1	1013-43	1	1018-48	0	1025-55	4
0920-50	0	0928-58	1	0937-07	4	0947-17	0	1012-42	0	1022-52	0	1030-00	2	1043-13	0	1048-18	0	1055-25	2
0950-20	0	0958-28	0	1007-37	0	1017-47	1	1042-12	0	1052-22	1	1100-30	0	1113-43	0	1118-48	0	1125-55	0
1020-50	0	1028-58	0	1037-07	2	1047-17	0	1112-42	0	1122-52	1	1130-00	1	1143-13	0	1148-18	0	1155-25	1

Conemaugh Plume 28 April 1971

G-36 5 SBE GMQ 343/0.8		G-35 25 SBE GMQ 345/1.6		G-8 40 SBE BMQ 346/2.1		G-16 125 SBE EMQ 353/3.4		G-27 190 SBE EMQ 356/6.1		G-26 35 SBE BMQ 010/3.6		G-6 220 SBE AMQ 348/7.3		G-1 190 SBE AMO 359/7.4		G-20 235 SBE EMQ 353/9.5		G-25 215 SBE BMQ 003/9.8	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0745-15	0	0750-20	0	0755-25	0	0803-33	0	0812-42	0	0822-52	0	0835-05	0	0844-14	0	0854-24	0	0903-33	0
0815-45	0	0820-50	0	0825-55	0	0833-03	0	0842-12	0	0852-22	0	0905-35	0	0914-44	0	0924-54	0	0933-03	0
0845-15	0	0850-20	0	0855-25	0	0903-33	0	0912-42	0	0922-52	0	0935-05	0	0944-14	0	0954-24	0	1003-33	0
0915-45	0	0920-50	0	0925-55	0	0933-03	0	0942-12	0	0952-22	0	1005-35	0	1014-44	0	1024-54	0	1033-03	0

Conemaugh Plume 29 April 1971

G-20 185 SBE BOQ 085/11.8		G-36 195 SBE FOQ 090/11.0		G-26 60 SBE CMQ 096/11.4		G-35 175 SBE AMQ 102/12.0		G-16 220 SBE FMQ 090/13.7		G-8 65 SBE CMQ 103/9.1		G-6 60 SBE CMQ 086/7.6		G-1 40 SBE CMQ 077/3.3		G-27 80 SBE COQ 090/3.3		G-25 155 SBE BOR 105/3.5	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0801-31	0	0819-49	0	0830-00	0	0840-10	2	0848-18	0	0907-37	0	0915-45	0	0927-57	0	0933-03	0	0940-10	0
0831-01	0	0849-19	0	0900-30	0	0910-40	2	0918-48	0	0937-07	1	0945-15	2	0957-27	0	1003-33	0	1010-40	0
0901-31	0	0919-49	0	0930-00	0	0940-10	1	0948-18	0	1007-37	0	1015-45	1	1027-57	0	1033-03	0	1040-10	0
0931-01	0	0949-19	0	1000-30	0	1010-40	0	1018-48	0	1037-07	1	1045-15	1	1057-27	0	1103-33	1	1110-40	0
1001-31	0	1019-49	0	1030-00	0	1040-10	1	1048-18	0	1107-37	2	1115-45	0	1127-57	0	1133-03	0	1140-10	0
1031-01	0	1049-19	0	1100-30	1	1110-40	1	1118-48	0	1137-07	2	1145-15	0	1157-27	0	1203-33	0	1210-40	0

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 4 May 1971

G-20 195 SBE FOQ 090/11.0		G-26 60 SBE CMQ 096/11.4		G-27 175 SBE AMQ 102/12.0		G-35 220 SBE FMQ 090/13.7		G-36 135 SBE COQ 117/9.6		G-6 175 SBE FMR 123/8.9		G-1 140 SBE AMQ 118/11.8		G-25 65 SBE CMQ 103/9.1		G-16 40 SBE CMQ 077/3.3		G-8 155 SBE BOR 105/3.5	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0758-28	0	0808-38	2	0818-48	2	0827-57	3	0852-22	0	0902- 1202	2	0922-52	0	0937-07	0	0953-23	0	1003-33	1
0828-58	1	0838-08	5	0848-18	2	0857-27	2	0922-52	0			0952-22	1	1007-37	0	1023-53	0	1033-03	2
0858-28	5	0908-38	6	0918-48	4	0927-57	2	0952-22	0			1022-52	0	1037-07	0	1053-23	0	1103-33	0
0928-58	0	0938-08	0	0948-18	0	0957-27	0	1022-52	0			1052-22	0	1107-37	0	1123-53	0	1133-03	9
0958-28	0	1008-38	0	1018-48	0	1027-57	0	1052-22	0			1122-52	0	1137-07	0	1153-23	0	1203-33	8
1028-58	0	1038-08	1	1048-18	0	1057-27	0	1122-52	0			1152-22	0	1207-37	0	1223-53	0	1233-03	4

Conemaugh Plume 5 May 1971

G-26 190 SBE FMQ 018/22.1		G-20 185 SBE BMQ 107/19.8		G-35 240 SBE EMQ 022/22.4		G-27 250 SBE EMQ 031/22.2		G-6 250 SBE EMQ 032/24.0		G-8 210 SBE AMQ 037/21.7		G-16 185 SBE EOQ 043/21.6		G-25 285 SBE AMQ 050/23.0		G-36 335 SBE CMQ 054/24.3		G-1 390 SBE BMR 057/25.9	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0725-55	0	0733-03	0	0742-12	0	0748-18	0	0755-25	2	0807-37	2	0813-43	3	0825-55	0	0831-01	1	0840-10	0
0755-25	0	0803-33	0	0812-42	0	0818-48	0	0825-55	2	0837-07	1	0843-13	2	0855-25	1	0901-31	3	0910-40	2
0825-55	0	0833-03	1	0842-12	1	0848-18	1	0855-25	2	0907-37	0	0913-43	1	0925-55	0	0931-01	1	0940-10	1
0855-25	0	0903-33	0	0912-42	0	0918-48	0	0925-55	0	0937-07	0	0943-13	0	0955-25	0	1001-31	0	1010-40	0
0925-55	1	0933-03	0	0942-12	1	0948-18	0	0955-25	0	1007-37	0	1013-43	1	1025-55	0	1031-01	0	1040-10	0
0955-25	3	1003-33	0	1012-42	1	1018-48	0	1025-55	0	1037-07	0	1043-13	0	1055-25	0	1101-31	0	1110-40	0

Conemaugh Plume 7 May 1971

G-26 10 SBE AMQ 270/17.1		G-35 10 SBE FMQ 266/17.8		G-20 5 SBE DMQ 260/18.3		G-36 5 SBE DMQ 256/20.4		G-1 15 SBE CMQ 258/22.6		G-25 20 SBE AMQ 255/25.1		G-27 10 SBE AMQ 306/16.1		G-6 10 SBE BMQ 298/16.8		G-8 10 SBE CMQ 293/18.3		G-16 -30 SBE GMQ 296/20.4	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0806-36	0	0814-44	0	0824-54	0	0831- 1131	0	0856-26	0	0907-37	0	0953-23	0	1000-30	1	1010-40	4	1018-48	1
0836-06	0	0844-14	0	0854-24	0			0926-56	0	0937-07	0	1023-53	1	1030-00	6	1040-10	2	1048-18	1
0906-36	0	0914-44	0	0924-54	0			0956-26	0	1007-37	0	1053-23	4	1100-30	3	1110-40	0	1118-48	0
0936-06	0	0944-14	0	0954-24	0			1026-56	0	1037-07	0	1123-53	0	1130-00	0	1140-10	0	1148-18	0
1006-36	0	1014-44	0	1024-54	0			1056-26	0	1107-37	0	1153-23	1	1200-30	0	1210-40	0	1218-48	0
1036-06	0	1044-14	0	1054-24	0			1126-56	0	1137-07	0	1223-53	1	1230-00	0	1240-10	0	1248-18	0

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 10 May 1971

G-1 15 SBE DMQ 233/5.3		G-36 25 SBE GMQ 235/8.6		G-26 35 SBE GMQ 232/11.7		G-27 105 SBE FMQ 237/15.5		G-20 65 SBE CMQ 229/16.5		G-35 85 SBE CMQ 224/14.5		G-16 135 SBE BMQ 219/12.5		G-25 30 SBE DMQ 219/9.4		G-8 60 SBE DMQ 208/9.5		G-6 145 SBE EMQ 213/7.4	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0758-28	0	0807-37	0	0815-45	0	0834-04	0	0843-13	0	0853-23	2	0902-32	0	0917-47	0	0927-57	2	0929-59	9
0828-58	1	0837-07	2	0845-15	1	0904-34	0	0913-43	13	0923-53	3	0932-02	5	0947-17	3	0957-27	11	0959-29	8
0858-28	0	0907-37	1	0915-45	0	0934-04	0	0943-13	5	0953-23	2	1002-32	3	1017-47	0	1027-57	4	1029-59	5
0928-58	2	0937-07	0	0945-15	0	1004-34	0	1013-43	0	1023-53	0	1032-02	0	1047-17	0	1057-27	2	1059-29	0
0958-28	2	1007-37	1	1015-45	0	1034-04	0	1043-13	0	1053-23	0	1102-32	0	1117-47	0	1127-57	2	1129-59	0
1028-58	0	1037-07	0	1045-15	0	1104-34	0	1113-43	-	1123-53	0	1132-02	0	1147-17	0	1157-27	0	1159-29	0

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G-36 -10 SBE BMQ 328/18.3		G-1 -10 SBE DMQ 326/16.3		G-27 -5 SBE CMQ 331/17.2		G-25 -20 SBE DMQ 320/15.9		G-35 125 SBE FMQ 330/14.7		G-16 160 SBE BMQ 322/8.5		G-20 220 SBE AMQ 328/6.3		G-8 105 SBE CMQ 316/6.8		G-6 140 SBE BMQ 326/3.8		G-26 85 SBE EMQ 324/1.4	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0732-02	3	0743-13	0	0750-20	2	0803-33	0	0810-40	6	0840-10	5	0845-15	0	0853-23	0	0904-34	3	0912-42	0
0802-32	12	0813-43	3	0820-50	7	0833-03	0	0840-10	14	0910-40	2	0915-45	5	0923-53	0	0934-04	3	0942-12	0
0832-02	2	0843-13	5	0850-20	14	0903-33	0	0910-40	8	0940-10	0	0945-15	0	0953-23	0	1004-34	7	1012-42	0
0902-32	0	0913-43	1	0920-50	1	0933-03	0	0940-10	0	1010-40	0	1015-45	0	1023-53	0	1034-04	0	1042-12	0
0932-02	0	0943-13	0	0950-20	0	1003-33	0	1010-40	0	1040-10	0	1045-15	0	1053-23	0	1104-34	0	1112-42	0
1002-32	0	1013-43	0	1020-50	0	1033-03	0	1040-10	0	1110-40	0	1115-45	0	1123-53	0	1134-04	0	1142-12	0

Conemaugh Plume 15 May 1971

G-36 100 SBE EMQ 360/16.2		G-20 140 SBE AMQ 004/14.1		G-25 215 SBE BMQ 003/9.8		G-27 190 SBE AMQ 359/7.4		G-1 155 SBE AMQ 014/7.9		G-16 145 SBE BMQ 028/9.0		G-26 120 SBE FMQ 007/11.6		G-8 35 SBE BMQ 010/3.6		G-6 125 SBE EMQ 353/3.4		G-35 5 SBE GMQ 343/0.8	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0722-52	1	0728-58	1	0741-11	0	0753-23	3	0801-31	1	0805-35	0	0815-45	0	0833-03	2	0843-13	4	0852-22	0
0752-22	4	0758-28	4	0811-41	3	0823-53	3	0831-01	2	0835-05	2	0845-15	2	0903-33	4	0913-43	6	0922-52	3
0822-52	7	0828-58	7	0841-11	6	0853-23	14	0901-31	0	0905-35	0	0915-45	2	0933-03	1	0943-13	5	0952-22	4
0852-22	1	0858-28	1	0911-41	4	0923-53	4	0931-01	1	0935-05	0	0945-15	0	1003-33	4	1013-43	4	1022-52	0
0922-52	4	0928-58	4	0941-11	4	0953-23	5	1001-31	0	1005-35	0	1015-45	2	1033-03	4	1043-13	9	1052-22	0
0952-22	5	0958-28	7	1011-41	4	1023-53	4	1031-01	0	1035-05	1	1045-15	3	1103-33	1	1113-43	9	1122-52	0

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 19 May 1971

G-36 285 SBE AMQ 050/23.0		G-27 335 SBE CMQ 054/24.3		G-26 390 SBE BMR 057/25.9		G-20 370 SBE ENQ 061/26.9		G-16 300 SBE FMQ 064/28.1		G-6 280 SBE AMQ 071/21.6		G-8 305 SBE BMQ 066/18.6		G-35 430 SBE BMQ 066/14.5		G-25 330 SBE CMQ 059/15.7		G-1 160 SBE FMQ 053/18.8	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0731-01	0	0735-05	1	0740-10	-	0745-15	0	0752-22	1	0812-42	2	0821-51	1	0829-59	4	0838-08	0	0850-20	0
0801-31	3	0805-35	0	0810-40	4	0815-45	5	0822-52	2	0842-12	5	0851-21	3	0859-29	0	0908-38	0	0920-50	2
0831-01	4	0835-05	5	0840-10	4	0845-15	4	0852-22	3	0912-42	5	0921-51	1	0929-59	2	0938-08	3	0950-20	2
0901-31	1	0905-35	1	0910-40	0	0915-45	1	0922-52	1	0942-12	1	0951-21	1	0959-29	0	1008-38	0	1020-50	1
0931-01	4	0935-05	4	0940-10	0	0945-15	1	0952-22	1	1012-42	0	1021-51	1	1029-59	0	1038-08	0	1050-20	0
1001-31	3	1005-35	1	1010-40	0	1015-45	0	1022-52	1	1042-12	0	1051-21	1	1059-29	0	1108-38	0	1120-50	1

Conemaugh Plume 20 May 1971

G-36 145 SBE EMQ 213/7.4		G-26 60 SBE DMQ 208/9.5		G-20 160 SBE BMQ 206/12.8		G-8 155 SBE BNR 105/3.5		G-27 80 SBE COQ 090/3.3		G-6 40 SBE CMQ 077/3.3		G-25 10 SBE GMQ 054/4.1		G-35 60 SBE CMQ 067/6.7	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0855-25	0	0910-40	0	0918-48	0	1007-37	0	1015-45	4	1020-50	6	1030-00	0	1040-10	3
0925-55	0	0940-10	0	0948-18	0	1037-07	1	1045-15	1	1050-20	7	1100-30	-	1110-40	0
0955-25	0	1010-40	2	1018-48	1	1107-37	3	1115-45	14	1120-50	10	1130-00	4	1140-10	6
1025-55	0	1040-10	0	1048-18	0	1137-07	2	1145-15	6	1150-20	4	1200-30	6	1210-40	4
1055-25	0	1110-40	0	1118-48	0	1207-37	2	1215-45	0	1220-50	1	1230-00	13	1240-10	0
1125-55	1	1140-10	0	1148-18	0	1237-07	1	1245-15	0	1250-20	0	1300-30	16	1310-40	1

Conemaugh Plume 18 October 1971

G-1 -5 SBE CMQ 331/17.2		G-8 -10 SBE DMQ 326/16.3		G-36 -10 SBE BMQ 328/18.3		G-35 205 SBE AMQ 332/7.8		G-26 160 SBE BMQ 322/8.5		G-25 220 SBE AMQ 328/6.3		G-6 105 SBE CMQ 316/6.8		G-27 140 SBE BMQ 326/3.8		G-16 90 SBE EMQ 331/2.3		G-20 85 SBE EMQ 324/1.4	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0751-21	0	0756-26	0	0803-33	0	0834-04	-	0840-10	1	0847-17	0	0855-25	4	0903-33	0	0909-39	0	0916-46	0
0821-51	0	0826-56	0	0833-03	0	0904-34	0	0910-40	1	0917-47	0	0925-55	1	0933-03	0	0939-09	0	0946-16	0
0851-21	0	0856-26	1	0903-33	0	0934-04	0	0940-10	3	0947-17	0	0955-25	1	1003-33	2	1009-39	0	1016-46	1
0921-51	0	0926-56	1	0933-03	0	1004-34	0	1010-40	2	1017-47	0	1025-55	5	1033-03	0	1039-09	0	1046-16	-
0951-21	0	0956-26	2	1003-33	0	1034-04	0	1040-10	1	1047-17	0	1055-25	8	1103-33	0	1109-39	0	1116-46	0
1021-51	0	1026-56	1	1033-03	1	1104-34	0	1110-40	4	1117-47	0	1125-55	7	1133-03	1	1139-09	0	1146-16	4

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 19 October 1971

G-35 -5 SBE		G-36 -10 SBE		G-27 125 SBE		G-25 -20 SBE		G-8 -20 SBE		G-6 225 SBE		G-20 160 SBE		G-16 105 SBE		G-1 135 SBE		G-26 80 SBE	
CMQ 331/17.2		DMQ 326/16.3		FMQ 330/14.7		DMQ 320/15.9		DMS 314/15.9		AMR 310/10.8		BMQ 322/8.5		CMQ 316/6.8		CMQ 313/4.0		AMQ 311/1.9	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0909-39	0	0916-46	0	0926-56	0	0933-03	0	0939-09	0	0956-26	10	1007-37	5	1013-43	3	1020-50	1	1031-01	0
0939-09	0	0946-16	0	0956-26	0	1003-33	0	1009-39	7	1026-56	15	1037-07	0	1043-13	8	1050-20	1	1101-31	0
1009-39	0	1016-46	0	1026-56	0	1033-03	0	1039-09	12	1056-26	19	1107-37	3	1113-43	9	1120-50	2	1131-01	1
1039-09	0	1046-16	0	1056-26	1	1103-33	0	1109-39	11	1126-56	12	1137-07	2	1143-13	4	1150-20	0	1201-31	3
1109-39	0	1116-46	1	1126-56	0	1133-03	0	1139-09	11	1156-26	6	1207-37	1	1213-43	2	1220-50	0	1231-01	0
1139-09	0	1146-16	1	1156-26	0	1203-33	0	1209-39	5	1226-56	3	1237-07	1	1243-13	0	1250-20	0	1301-31	0

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G-16 5 SBE		G-36 25 SBE		G-27 80 SBE		G-26 85 SBE		G-25 90 SBE		G-8 140 SBE		G-35 135 SBE		G-6 105 SBE		G-1 160 SBE		G-20 225 SBE	
GMQ 343/0.8		GMQ 345/1.6		AMQ 311/1.9		EMQ 324/1.4		EMQ 331/2.3		BMQ 326/3.8		CMQ 313/4.0		CMQ 316/6.8		BMQ 322/8.5		AMR 310/10.8	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0816-46	0	0820-50	0	0831-01	4	0844-14	5	0851-21	0	0858-28	2	0902-32	0	0911-41	4	0917-47	0	0929-59	3
0846-16	0	0850-20	0	0901-31	5	0914-44	4	0921-51	0	0928-58	0	0932-02	0	0941-11	4	0947-17	0	0959-29	3
0916-46	0	0920-50	0	0931-01	0	0944-14	0	0951-21	0	0958-28	0	1002-32	0	1011-41	4	1017-47	0	1029-59	3
0946-16	0	0959-20	0	1001-31	3	1014-44	0	1021-51	0	1028-58	0	1032-02	0	1041-11	2	1047-17	0	1059-29	1
1016-46	0	1020-50	0	1031-01	0	1044-14	0	1051-21	0	1058-28	0	1102-32	0	1111-41	5	1117-47	0	1129-59	1
1046-16	0	1050-20	0	1101-31	0	1114-44	0	1121-51	0	1128-58	0	1132-02	0	1141-11	6	1147-17	0	1159-29	1

Conemaugh Plume 21 October 1971

G-27 160 SBE		G-36 200 SBE		G-26 85 SBE		G-25 130 SBE		G-8 110 SBE		G-20 155 SBE		G-35 100 SBE		G-1 130 SBE		G-6 135 SBE	
BMQ 357/24.9		BOQ 001/24.6		BMQ 004/22.2		BMQ 008/18.3		EMQ 004/19.1		GMQ 356/19.6		EMQ 360/16.2		BMR 356/15.1		FMQ 352/17.4	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0847-17	0	0852-22	0	0902-32	0	0918-48	0	0927-57	0	0940-10	0	0947-17	0	0955-25	0	1007-37	6
0917-47	0	0922-52	0	0932-02	0	0948-18	0	0957-27	0	1010-40	0	1017-47	0	1025-55	2	1037-07	5
0947-17	0	0952-22	0	1002-32	0	1018-48	0	1027-57	0	1040-10	4	1047-17	0	1055-25	2	1107-37	5
1017-47	0	1022-52	0	1032-02	0	1048-18	0	1057-27	0	1110-40	0	1117-47	0	1125-55	2	1137-07	4

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS- BUBBLERS

Conemaugh Plume 22 October 1971

G-16 75 SBE CMQ 342/9.9		G-36 220 SBE AMQ 348/7.3		G-27 190 SBE AMQ 359/7.4		G-8 215 SBE BMQ 003/9.8		G-25 235 SBE EMQ 353/9.5		G-35 190 SBE EMQ 356/6.1		G-6 160 SBE BMQ 353/4.8		G-1 125 SBE EMQ 353/3.4		G-26 40 SBE BMQ 346/2.1		G-20 5 SBE GMQ 343/0.8	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0820-50	0	0829-59	0	0835-05	0	0845-15	0	0854-24	0	0902-32	0	0908-38	0	0914-44	0	0920-50	0	0926-56	0
0850-20	0	0859-29	0	0905-35	0	0915-45	4	0924-54	0	0932-02	0	0938-08	0	0944-14	0	0950-20	0	0956-26	0
0920-50	0	0929-59	0	0935-05	0	0945-15	0	0954-24	0	1002-32	0	1008-38	0	1014-44	0	1020-50	0	1026-56	0
0950-20	0	0959-29	0	1005-35	2	1015-45	2	1024-54	0	1032-02	0	1038-08	0	1044-14	0	1050-20	0	1056-26	0
1020-50	0	1029-59	0	1035-05	2	1045-15	7	1054-24	0	1102-32	0	1108-38	0	1114-44	0	1120-50	0	1126-56	0
1050-20	0	1059-29	0	1105-35	-	1115-45	5	1124-54	0	1132-02	0	1138-08	0	1144-14	0	1150-20	0	1156-26	0

Conemaugh Plume 2 November 1971

G-6 5 SBE GMQ 063/1.9		G-25 10 SBE GMQ 054/4.1		G-8 75 SBE BOQ 052/5.6		G-20 65 SBE BOQ 044/6.3		G-36 60 SBE DMR 057/6.9		G-1 85 SBE FMQ 047/7.6		G-16 120 SBE FMQ 049/8.4		G-27 225 SBE FMQ 054/11.2		G-35 430 SBE BMQ 066/14.5		G-26 330 SBE CMQ 059/15.7	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0911-41	0	0918-48	0	0932-02	0	0943-13	1	0950-20	0	0957-27	0	1003-33	0	1012-42	0	1022-52	0	1031-01	0
0941-11	0	0948-18	0	1002-32	0	1013-43	3	1020-50	0	1027-57	0	1033-03	0	1042-12	0	1052-22	0	1101-31	1
1011-41	0	1018-48	3	1032-02	1	1043-13	2	1050-20	0	1057-27	0	1103-33	0	1112-42	0	1122-52	0	1131-01	1
1041-11	0	1048-18	0	1102-32	0	1113-43	2	1120-50	0	1127-57	0	1133-03	3	1142-12	0	1152-22	0	1201-31	0
1111-41	0	1118-48	0	1132-02	2	1143-13	4	1150-20	2	1157-27	0	1203-33	0	1212-42	0	1222-52	0	1231-01	0
1141-11	0	1148-18	0	1202-32	2	1213-43	4	1220-50	2	1227-57	0	1233-03	0	1242-12	0	1252-22	0	1301-31	0

Conemaugh Plume 3 November 1971

G-6 5 SBE GMQ 063/1.9		G-27 10 SBE GMQ 066/3.2		G-35 40 SBE CMQ 077/3.3		G-25 80 SBE COQ 090/3.3		G-1 60 SBE CMQ 067/6.7		G-16 60 SBE CMQ 086/7.6		G-26 185 SBE BNQ 085/11.8		G-8 325 SBE EMQ 078/12.5		G-20 410 SBE EMQ 069/13.0		G-36 430 SBE BMQ 066/14.5	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
1038-08	0	1045-15	0	1051-21	0	1057-27	0	1114-44	1	1119-49	0	1138-08	4	1146-16	0	1153-23	0	1200-30	0
1108-38	0	1115-45	0	1121-51	1	1127-57	0	1144-14	0	1149-19	1	1208-38	4	1216-46	0	1223-53	0	1230-00	0
1138-08	0	1145-15	0	1151-21	2	1157-27	0	1214-44	0	1219-49	0	1238-08	2	1246-16	0	1253-23	0	1300-30	0
1208-38	0	1215-45	0	1221-51	0	1227-57	0	1244-14	0	1249-19	0	1308-38	0	1316-46	1	1323-53	0	1330-00	0
1238-08	0	1245-15	0	1251-21	1	1257-27	1	1314-44	0	1319-49	0	1338-08	0	1346-16	1	1353-23	1	1400-30	0
1308-38	0	1315-45	0	1321-51	0	1327-57	0	1344-14	2	1349-19	0	1408-38	1	1416-46	0	1423-53	1	1430-00	0

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 4 November 1971

G-25 155 SBE BNR 105/3.5		G-26 80 SBE COQ 090/3.3		G-6 40 SBE CMQ 077/3.3		G-27 10 SBE GMQ 066/3.2		G-35 60 SBE CMQ 086/7.6		G-1 65 SBE CMQ 103/9.1		G-16 220 SBE FMQ 090/13.7		G-8 60 SBE CMQ 096/11.4		G-36 195 SBE FOQ 090/11.0		G-20 185 SBE BNQ 085/11.8	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0851-21	0	0900-30	0	0905-35	2	0908-38	0	0920-50	0	0927-57	0	0950-20	0	1007-37	0	1016-46	0	1025-55	0
0921-51	0	0930-00	0	0935-05	4	0938-08	0	0950-20	0	0957-27	3	1020-50	0	1037-07	0	1046-16	0	1055-25	0
0951-21	0	1000-30	0	1005-35	2	1008-38	0	1020-50	0	1027-57	3	1050-20	0	1107-37	1	1116-46	0	1125-55	0
1021-51	0	1030-00	0	1035-05	2	1038-08	0	1050-20	0	1057-27	1	1120-50	0	1137-07	1	1146-16	0	1155-25	0
1051-21	0	1100-30	3	1105-35	0	1108-38	0	1120-50	0	1127-57	0	1150-20	0	1207-37	2	1216-46	0	1225-55	1
1121-51	0	1130-00	4	1135-05	0	1138-08	0	1150-20	0	1157-27	2	1220-50	0	1237-07	4	1246-16	0	1255-25	3

Conemaugh Plume 5 November 1971

G-25 185 SBE FOQ 043/21.6		G-36 285 SBE AMQ 050/23.0		G-1 335 SBE CMQ 054/24.3		G-26 160 SBE FMQ 053/18.8		G-6 185 SBE BMQ 040/18.0		G-35 185 SBE FMQ 036/14.6		G-27 95 SBE DMQ 040/12.1		G-16 120 SBE FMQ 049/8.4		G-20 100 SBE CMP 027/10.2		G-8 115 SBE FMQ 038/7.9	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0943-13	0	0952-22	0	0958-28	0	1014-44	0	1031-01	0	1043- 1343	4	1052-22	0	1102-32	0	1120-50	1	1130-00	10
1013-43	0	1022-52	0	1028-58	0	1044-14	1	1101-31	0			1122-52	6	1132-02	4	1150-20	10	1200-30	1
1043-13	0	1052-22	0	1058-28	1	1114-44	1	1131-01	0			1152-22	0	1202-32	0	1220-50	2	1230-00	0
1113-43	0	1122-52	0	1128-58	0	1144-14	0	1201-31	0			1222-52	0	1232-02	0	1250-20	0	1300-30	0
1143-13	0	1152-22	0	1158-28	0	1214-44	1	1231-01	0			1252-22	0	1302-32	0	1320-50	0	1330-00	0
1213-43	0	1222-52	0	1228-58	0	1244-14	1	1301-31	0			1322-52	0	1332-02	-	1350-20	0	1400-30	0

Conemaugh Plume 6 November 1971

G-26 240 SBE EMQ 022/22.4		G-35 250 SBE EMQ 031/22.2		G-6 210 SBE AMQ 037/21.7		G-36 275 SBE AMQ 029/19.1		G-25 280 SBE CMQ 023/17.2		G-16 290 SBE EMQ 023/13.7		G-1 120 SBE BMQ 027/11.7		G-27 35 SBE DMQ 028/6.1		G-20 145 SBE BMQ 028/9.0		G-8 240 SBE FMQ 030/15.4	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0943-13	0	0951-21	0	0956-26	0	1007-37	0	1015-45	0	1026-56	2	1032-02	2	1055-25	0	1103-33	4	1117-47	6
1013-43	1	1021-51	5	1026-56	0	1037-07	1	1045-15	0	1056- 1326	1	1102-32	3	1125-55	8	1133-03	5	1147-17	4
1043-13	0	1051-21	-	1056-26	0	1107-37	0	1115-45	0			1132-02	6	1155-25	5	1203-33	3	1217-47	3
1113-43	0	1121-51	3	1126-56	0	1137-07	1	1145-16	0			1202-32	1	1225-55	2	1233-03	0	1247-17	2
1143-13	0	1151-21	4	1156-26	4	1207-37	1	1215-45	0			1232-02	0	1255-25	11	1303-33	4	1317-47	8
1213-43	0	1221-51	5	1226-56	5	1237-07	0	1245-15	0			1302-32	1	1325-55	8	1333-03	0	1347-17	4

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 9 November 1971

G-8 135 SBE FMQ 352/17.4		G-27 155 SBE GMQ 356/19.6		G-6 110 SBE EMQ 004/19.1		G-16 100 SBE EMQ 360/16.2		G-26 140 SBE AMQ 004/14.1		G-20 215 SBE BMQ 003/9.8		G-35 235 SBE EMQ 353/9.5		G-25 190 SBE AMQ 359/7.4		G-1 160 SBE BMQ 353/4.8		G-36 35 SBE DMQ 028/6.1	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
1008-38	5	1015-45	4	1027-57	2	1038-08	1	1045-15	4	1057-27	0	1103-33	0	1110-40	0	1117-47	0	1130-00	0
1038-08	3	1045-15	5	1057-27	5	1108-		1115-45	3	1127-57	0	1133-03	0	1140-10	0	1147-17	0	1200-30	0
1108-38	2	1115-45	2	1127-57	1	1238	1	1145-15	1	1157-27	0	1203-33	0	1210-40	0	1217-47	0	1230-00	0
1138-08	1	1145-15	0	1157-27	0			1215-45	0	1227-57	1	1233-03	0	1240-10	1	1247-17	0	1300-30	1

Conemaugh Plume 12 November 1971

G-20 280 SBE AMQ 071/21.6		G-25 230 SBE DOQ 071/18.2		G-8 240 SBE FMQ 075/15.5		G-27 305 SBE BMQ 066/18.6		G-1 395 SBE BMQ 065/16.7		G-26 330 SBE CMQ 059/15.7		G-6 430 SBE BMQ 066/14.5		G-36 410 SBE EMQ 069/13.0		G-35 325 SBE EMQ 078/12.5		G-16 185 SBE BNQ 085/11.8	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
1003-33	2	1023-53	0	1037-07	1	1052-22	1	1057-27	0	1105-35	1	1112-42	4	1118-48	0	1123-53	5	1127-57	2
1033-03	2	1053-23	3	1107-37	8	1122-52	2	1127-57	1	1135-05	1	1142-12	4	1148-18	0	1153-23	8	1157-27	4
1103-33	3	1123-53	4	1137-07	10	1152-22	0	1157-27	1	1205-35	1	1212-42	4	1218-48	2	1223-53	11	1227-57	3
1133-03	2	1153-23	2	1207-37	3	1222-52	1	1227-57	1	1235-05	1	1242-12	2	1248-18	4	1253-23	6	1257-27	0
1203-33	1	1223-53	2	1237-07	3	1252-22	1	1257-27	1	1305-35	1	1312-42	5	1318-48	7	1323-53	4	1327-57	1
1233-03	2	1253-23	4	1307-37	8	1322-52	2	1327-57	4	1335-05	4	1342-12	4	1348-18	8	1353-23	2	1357-27	2

Conemaugh Plume 17 November 1971

G-36 120 SBE FMQ 007/11.6		G-8 235 SBE EMQ 353/9.5		G-6 155 SBE AMQ 014/7.9		G-16 145 SBE BMQ 028/9.0		G-26 120 SBE BMQ 027/11.7		G-25 95 SBE DMQ 040/12.1		G-35 225 SBE FMQ 054/11.2		G-27 430 SBE BMQ 066/14.5		G-20 330 SBE CMQ 059/15.7		G-1 325 SBE EMQ 078/12.5	
EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm	EST	pphm
0848-18	0	0900-30	2	0911-41	2	0916-46	0	0925-55	0	0936-06	0	0945-15	0	0953-23	0	1000-30	0	1014-44	0
0918-48	0	0930-00	2	0941-11	2	0946-16	0	0955-25	0	1006-36	0	1015-45	0	1023-53	0	1030-00	0	1044-14	0
0948-18	0	1000-30	4	1011-41	2	1016-46	0	1025-55	0	1036-06	1	1045-15	0	1053-23	0	1100-30	0	1114-44	0
1018-48	0	1030-00	4	1041-11	3	1046-16	0	1055-25	0	1106-36	0	1115-45	0	1123-53	0	1130-00	1	1144-14	0
1048-18	0	1100-30	5	1111-41	8	1116-46	2	1125-55	4	1136-06	2	1145-15	0	1153-23	0	1200-30	0	1214-44	1
1118-48	0	1130-00	6	1141-11	10	1146-16	1	1155-25	11	1206-36	1	1215-45	0	1223-53	0	1230-00	0	1244-14	1

Table 7. (continued) AVERAGE GROUND-LEVEL SO_2 CONCENTRATIONS - BUBBLERS

Conemaugh Plume 17 November 1971 (continued)

G-16 250 SBE EMQ 031/22.2		G-8 250 SBE AMQ 033/19.4		G-6 230 SBE AMQ 034/21.9		G-36 210 SBE AMQ 037/21.7	
EST	pphm	EST	pphm	EST	pphm	EST	pphm
1644-14	2	1700-30	3	1706-36	2	1710-40	3
1714-44	2	1730-00	2	1736-06	4	1740-10	2
1744-14	0	1800-30	1	1806-36	2	1810-40	4
1814-44	0	1830-00	0	1836-06	2	1840-10	3
1844-14	0	1900-30	0	1906-36	2	1910-40	2
1914-44	3	1930-00	2	1936-06	2	1940-10	1

HELICOPTER TEMPERATURE PROFILES

Table 8 lists the helicopter temperature profiles obtained during spiral ascents just upwind of the Conemaugh and Keystone Stations. Dry-bulb and wet-bulb temperatures are listed for 50-meter intervals above the applicable stack base elevation; additional levels such as bases and tops of inversions are also listed. Wet-bulb values are occasionally missing because the sensor froze.

On most profiles, surface dry-bulb and wet-bulb values are included. These temperatures were measured within 1 meter of the surface during 10-mps or greater forward speeds so that no downwash interfered with the readings. To allow for changing pressure patterns during an experiment, the helicopter landed before each profile so the indicated surface height from the pressure transducer could be recorded. A flight time of approximately 5 to 7 minutes was required to complete a 1000-meter profile.

During the 1971 series, three helicopter temperature profiles were originated about 4 kilometers north of the Conemaugh Generating Station because of ground fog in the valley surrounding the station. The origin for these profiles (578, 658, and 659) is indicated in the subsequent legend. Also included in the legend is the origin for profile 636 which was executed 16 kilometers north of Conemaugh because of low fuel supply.

Table 8. HELICOPTER TEMPERATURE PROFILES

Legend

Ascn : Individual ascension or profile designation.
EST : Beginning time of profile.
Conemaugh : Profile origin immediately upwind of Conemaugh stacks.
Conemaugh C-3 : Profile origin 353°/3.5 kilometers from Conemaugh stacks.
Conemaugh C-5 : Profile origin 010°/16.0 kilometers from Conemaugh stacks.
Keystone : Profile origin immediately upwind of Keystone stacks.
Z, m : Height above Conemaugh or Keystone stack base elevation in whole meters.
WB, °C : Wet-bulb temperature in degrees Centigrade to nearest tenth.
T, °C : Dry-bulb temperature in degrees Centigrade to nearest tenth.
Sfc : Temperatures measured within one meter of Conemaugh or Keystone stack base elevation.
--- : Missing data.

Table 8. HELICOPTER TEMPERATURE PROFILES

Ascn 551 21 Apr 71 0650 EST Conemaugh			Ascn 552 21 Apr 71 0942 EST Conemaugh			Ascn 553 21 Apr 71 1220 EST Conemaugh			Ascn 554 22 Apr 71 0654 EST Conemaugh			Ascn 555 22 Apr 71 0839 EST Conemaugh			Ascn 556 23 Apr 71 0704 EST Conemaugh			Ascn 557 23 Apr 71 0821 EST Conemaugh		
Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C
Sfc	7.4	8.1	Sfc	10.0	14.0	Sfc	10.8	13.0	Sfc	2.6	3.5	Sfc	3.5	4.5	Sfc	1.2	1.9	Sfc	5.4	7.4
45	6.5	6.7	50	9.6	13.8	50	10.3	12.7	50	2.4	3.3	50	3.2	4.2	50	0.5	0.9	50	4.4	6.4
50	6.6	6.9	100	9.3	13.5	100	10.0	12.3	100	2.1	2.9	100	2.9	3.7	55	1.1	1.8	100	3.8	5.8
90	6.4	7.6	150	8.8	13.0	150	9.6	11.8	150	1.9	2.5	150	2.5	3.3	100	1.1	2.1	150	3.4	5.4
100	6.6	8.2	200	8.5	12.6	200	9.3	11.4	200	1.4	2.0	200	2.2	2.8	150	1.4	2.6	200	3.1	5.0
150	6.8	9.0	250	8.6	12.4	250	9.1	11.1	250	1.1	1.5	250	1.7	2.2	200	1.5	2.9	250	2.7	4.5
170	6.7	9.0	300	7.9	11.7	300	8.9	10.7	300	0.8	1.0	300	1.5	1.9	250	1.7	3.4	300	2.3	4.2
200	6.8	9.9	350	7.9	11.4	350	8.5	10.1	350	---	- 0.3	350	1.1	1.4	300	1.6	3.2	350	2.0	3.7
210	6.8	10.0	400	7.6	11.0	400	8.0	9.6	400	---	0.2	400	0.8	1.0	350	1.3	2.8	400	1.6	3.2
235	7.6	11.8	450	7.1	10.4	450	7.9	9.4	450	---	- 0.2	450	1.4	1.5	400	1.2	2.6	450	1.4	2.9
250	7.6	11.9	500	7.1	10.1	500	7.6	8.8	500	---	- 0.5	500	0.2	0.2	450	1.2	2.6	500	0.9	2.6
300	7.8	11.8	550	7.2	9.7	550	7.3	8.3	515	---	- 0.7	510	---	0.0	500	1.2	2.4	510	0.8	2.6
350	8.2	12.6	600	7.0	9.2	600	6.8	7.8							550	0.8	1.9	550	0.4	2.1
400	8.2	12.4	650	7.1	9.0	650	6.4	7.4							600	0.8	1.8	600	0.0	1.6
450	8.0	12.6	700	7.3	8.8	700	6.0	7.0							650	0.6	1.6	650	- 0.4	1.1
500	7.7	12.5	750	7.4	8.5	750	5.6	6.6							700	0.2	1.1	700	- 0.6	0.8
550	7.0	12.8	800	7.6	8.5	800	5.3	6.3							750	- 0.1	0.7	750	- 1.1	0.3
580	8.6	13.0	850	7.4	8.1	850	5.2	5.9							800	- 0.3	0.3	800	---	- 0.1
600	7.8	12.9	900	7.0	7.6	865	4.7	5.4							850	---	- 0.2	850	---	- 0.4
650	8.4	12.6	950	6.8	7.5	900	4.0	6.4							900	---	- 0.6	900	---	- 0.6
700	8.6	12.4	1000	6.3	7.0	950	3.4	6.2							950	---	- 0.9	950	---	- 1.0
710	8.5	12.5	1050	5.8	6.7	1000	3.2	6.2							1000	---	- 1.2	1000	---	- 1.4
750	8.2	12.1	1095	5.4	6.7	1050	3.0	5.9							1050	---	- 1.3	1050	---	- 2.0
800	8.0	11.8				1085	3.4	6.0							1100	---	- 1.4	1090	---	- 2.2
850	7.7	11.4													1105	---	- 1.4			
900	7.5	10.9																		
950	7.0	10.6																		
1000	6.5	10.2																		
1050	6.1	9.6																		
1090	7.2	9.2																		

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 558 23 Apr 71 1005 EST Conemaugh			Ascn 559 23 Apr 71 1147 EST Conemaugh			Ascn 560 24 Apr 71 0647 EST Conemaugh			Ascn 561 24 Apr 71 0846 EST Conemaugh			Ascn 562 24 Apr 71 0930 EST Conemaugh			Ascn 563 26 Apr 71 0548 EST Conemaugh			Ascn 564 26 Apr 71 0756 EST Conemaugh		
Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C
Sfc	5.7	9.4	Sfc	8.0	12.0	Sfc	1.8	2.2	Sfc	6.7	9.8	Sfc	6.4	8.9	Sfc	4.7	5.1	Sfc	5.9	7.4
50	5.7	8.8	50	7.0	10.6	40	0.9	1.3	50	6.3	9.6	20	6.2	8.9	20	4.2	4.6	50	5.8	7.2
100	5.1	8.0	100	6.4	10.0	50	1.5	2.0	100	6.0	9.2	50	5.9	8.6	50	4.4	5.1	100	5.5	6.7
150	4.6	7.4	150	6.3	9.7	90	1.2	2.1	150	5.6	8.6	100	5.6	8.2	80	5.1	6.4	150	5.2	6.4
200	4.4	7.2	200	5.7	9.0	100	1.8	3.2	200	5.3	8.2	150	5.3	7.8	100	5.1	6.5	200	4.8	6.0
250	4.0	6.6	250	5.4	8.7	150	1.7	3.4	250	5.1	7.8	200	5.0	7.4	150	5.0	6.3	250	4.5	5.6
300	3.6	6.2	300	5.0	8.4	200	1.9	3.6	300	4.6	7.2	250	4.7	7.0	200	5.0	6.2	300	4.1	5.3
350	3.2	5.6	350	4.8	8.2	220	2.0	3.8	350	4.3	6.8	300	4.3	6.5	250	4.5	5.6	350	3.7	4.7
400	3.0	5.2	400	4.4	7.6	250	2.8	5.0	400	4.1	6.4	350	3.9	6.0	300	4.3	5.3	400	3.5	4.3
450	2.6	4.8	450	4.3	7.4	300	3.1	5.9	450	3.7	5.9	400	3.7	5.7	350	4.1	5.0	450	3.0	3.8
500	2.4	4.6	500	4.3	7.4	350	3.8	6.9	500	3.3	5.5	450	3.5	5.4	400	3.9	4.8	500	2.5	3.2
550	1.9	3.9	550	3.7	6.7	380	4.0	7.3	550	3.0	5.0	500	3.1	4.9	450	3.7	4.5	550	2.1	2.7
600	1.6	3.5	600	3.3	6.0	400	4.0	7.2	600	2.7	4.6	550	2.6	4.4	500	3.4	4.1	600	1.8	2.4
650	1.2	3.0	650	2.8	5.4	450	3.9	7.0	650	2.4	4.2	565	2.5	4.2	550	3.1	3.8	650	1.4	2.0
700	0.9	2.6	700	2.3	4.7	500	3.7	6.9	700	1.9	3.6				600	2.7	3.2	700	0.9	1.3
750	0.4	2.0	750	1.9	4.2	550	3.6	6.6	750	1.7	3.2				650	2.6	3.0	750	0.6	0.9
800	- 0.2	1.3	800	1.7	4.0	600	3.4	6.2	800	1.4	2.9				700	1.9	2.2	800	0.4	0.6
850	- 0.4	1.0	850	1.2	3.4	650	3.3	5.9	850	1.1	2.5				750	1.8	2.1	850	0.2	0.3
900	- 0.7	0.5	900	0.8	2.8	700	3.1	5.8	900	0.8	2.0				800	1.5	1.7	900	---	0.0
950	---	0.0	950	0.3	2.2	750	2.6	5.4	950	0.2	1.2				850	1.3	1.4	950	---	- 0.2
1000	---	- 0.5	1000	- 0.1	1.8	800	2.3	5.0	1000	- 0.1	0.9				900	1.0	1.0	1000	---	- 0.5
1050	---	- 0.9	1050	- 0.6	1.2	850	2.0	4.6	1050	- 0.3	0.9				950	---	0.7	1050	---	- 0.8
1100	---	- 1.4	1100	- 0.9	0.8	900	1.7	4.3	1075	- 0.4	0.8				1000	---	0.3	1100	---	- 1.2
1115	---	- 1.5	1120	- 1.0	0.6	950	1.4	3.9							1050	---	0.2			
						1000	1.1	3.5							1095	---	- 0.2			
						1050	1.0	3.2												
						1065	0.7	3.0												

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 565 26 Apr 71 0908 EST Conemaugh			Ascn 566 26 Apr 71 1025 EST Conemaugh			Ascn 567 28 Apr 71 0551 EST Conemaugh			Ascn 568 28 Apr 71 0744 EST Conemaugh			Ascn 569 29 Apr 71 0547 EST Conemaugh			Ascn 570 29 Apr 71 0740 EST Conemaugh			Ascn 571 4 May 71 0541 EST Conemaugh		
Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C
Sfc	6.1	8.0	Sfc	6.0	7.8	Sfc	8.3	9.4	Sfc	9.3	9.9	Sfc	5.9	7.1	Sfc	5.6	6.6	Sfc	1.3	2.0
50	5.7	7.5	50	5.6	7.4	50	7.9	9.2	50	8.8	9.8	50	5.6	7.0	50	5.0	6.3	50	1.4	2.0
100	5.5	7.1	100	5.3	7.0	100	7.7	8.9	100	8.6	9.5	100	5.4	6.6	100	4.9	5.9	100	1.1	1.7
150	5.2	6.8	150	5.0	6.6	150	7.6	8.7	150	8.4	9.2	150	5.2	6.2	150	4.3	5.4	150	0.9	1.5
200	4.9	6.3	200	4.7	6.2	200	7.7	8.8	200	8.7	9.5	200	4.7	5.8	200	4.0	5.0	200	0.6	1.1
250	4.6	5.9	250	4.3	5.7	250	7.6	8.8	250	8.4	9.2	250	4.4	5.4	250	3.6	4.6	250	0.3	0.7
300	4.2	5.4	300	3.8	5.2	300	7.3	8.2	280	8.2	8.9	300	4.1	5.0	300	3.3	4.1	300	0.0	0.4
350	4.0	5.0	350	3.6	4.8	350	7.0	7.8	300	8.3	9.1	350	3.7	4.5	350	2.9	3.6	350	- 0.2	0.1
400	3.5	4.5	400	3.2	4.3	400	6.8	7.5	350	8.0	8.7	400	3.4	4.0	400	2.6	3.1	400	---	- 0.3
450	3.1	4.0	450	2.8	3.8	450	6.5	7.0	400	7.8	8.3	450	3.1	3.5	450	2.2	2.7	450	---	- 0.8
500	2.7	3.5	500	2.5	3.4	500	6.4	6.8	450	7.7	8.1	500	2.7	3.1	500	1.7	2.2	500	---	- 0.9
550	2.5	3.1	550	2.1	2.9	510	6.8	7.4	500	7.7	8.0	550	2.3	2.6	550	1.3	1.7	550	---	- 1.0
600	2.1	2.6	600	1.6	2.4	550	6.5	7.0	550	7.7	8.0	600	1.9	2.1	600	1.1	1.4	600	---	- 1.4
650	1.7	2.1	650	1.2	1.9	600	6.3	6.6	570	7.8	8.1	650	1.5	1.6	650	0.7	0.9	650	---	- 2.0
700	1.1	1.7	700	1.1	1.7	620	6.2	6.5				700	1.1	1.1	700	0.4	0.4	700	---	- 0.7
750	0.8	1.0	750	0.3	0.8	650	6.4	6.8				750	---	0.6	750	---	0.1	750	---	- 0.2
800	0.2	0.9	800	0.1	0.4	700	6.5	7.0				800	---	0.2	800	---	- 0.5	780	---	0.0
850	0.0	0.7	850	0.0	0.0	750	6.8	7.3				840	---	0.0				800	---	0.8
900	- 0.3	0.2	900	---	- 0.5	800	6.9	7.5										850	---	0.4
950	- 0.2	- 0.2	950	---	- 1.0	850	7.1	7.6										900	---	0.1
1000	---	- 0.6	1000	---	- 1.5	885	7.1	7.5										950	---	- 0.3
1050	---	- 1.0	1050	---	- 1.8	900	7.5	8.2										1000	---	- 0.6
1085	---	- 1.2	1095	---	- 2.2	950	7.8	8.2										1050	---	- 0.9
						1000	7.8	8.1										1100	---	- 1.3
																		1110	---	- 1.4

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 572 4 May 71 0735 EST Conemaugh			Ascn 573 4 May 71 0851 EST Conemaugh			Ascn 574 4 May 71 1031 EST Conemaugh			Ascn 575 5 May 71 0546 EST Conemaugh			Ascn 576 5 May 71 0728 EST Conemaugh			Ascn 577 5 May 71 0906 EST Conemaugh			Ascn 578 7 May 71 0748 EST Conemaugh C-3		
Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C
Sfc	2.9	4.2	Sfc	4.4	6.0	Sfc	9.0	12.2	Sfc	7.3	8.7	Sfc	8.2	10.4	Sfc	12.6	16.7	Sfc	---	---
50	2.7	3.6	50	3.8	5.4	50	6.8	9.8	30	6.4	7.4	30	7.8	9.7	50	11.0	15.6	50	---	---
100	2.2	3.0	100	3.3	4.8	75	6.1	8.9	50	7.1	9.0	50	7.9	10.2	100	10.3	14.9	100	---	---
150	2.0	2.7	150	3.0	4.4	100	6.3	9.5	100	7.2	9.6	100	7.7	9.9	150	9.9	14.3	150	9.2	9.4
200	1.4	2.0	200	2.7	4.0	150	6.1	9.1	150	7.4	9.8	150	7.5	9.8	200	9.7	14.1	200	8.6	8.6
250	1.0	1.5	250	2.6	3.8	200	5.3	8.1	170	7.5	10.1	200	7.4	9.8	250	9.3	13.6	210	8.5	8.5
300	0.8	1.1	300	2.0	3.1	250	4.6	7.2	200	7.2	9.7	250	7.5	9.8	300	9.0	13.1	250	9.6	10.6
350	0.5	0.7	350	1.6	2.7	300	4.1	6.6	250	7.2	9.6	300	7.4	9.6	350	8.8	12.8	300	9.6	11.0
400	0.2	0.4	400	1.4	2.4	350	3.8	6.2	300	6.9	9.3	350	6.7	9.0	400	8.3	12.3	350	9.4	10.8
450	---	- 0.2	450	0.9	1.8	400	3.6	6.0	350	7.0	9.4	400	6.6	8.9	450	8.0	11.7	365	9.3	10.7
500	---	- 0.9	500	0.4	1.4	450	3.0	5.3	400	6.7	9.1	420	6.4	9.0	500	7.8	11.3	400	9.5	10.9
550	---	- 0.2	550	0.1	0.9	500	2.7	4.8	450	6.5	8.8	450	6.6	9.2	550	7.4	10.8	450	9.0	11.0
600	---	0.6	600	- 0.1	1.1	550	2.3	4.3	500	6.4	8.6	500	6.5	8.9	600	7.2	10.4	500	8.9	10.7
640	---	1.8	650	- 0.6	0.2	600	2.0	3.9	550	6.2	8.4	550	6.3	8.8	650	6.8	9.8	550	8.8	10.4
650	---	1.8	700	---	- 0.2	650	1.7	3.6	600	6.0	8.3	600	5.8	8.3	700	6.4	9.4	600	8.7	10.2
700	---	1.4	750	---	- 0.4	700	1.4	3.2	650	5.7	7.9	650	5.5	7.9	750	6.2	9.1	630	8.6	10.0
750	---	1.1	800	---	- 0.4	750	1.2	2.8	700	5.6	7.8	700	5.3	7.8	800	6.1	8.9	650	8.4	10.2
800	---	0.8	850	---	- 0.6	800	0.7	2.2	750	5.6	8.0	750	5.0	7.4	850	5.8	8.4	700	7.8	10.1
850	---	0.3	900	---	- 0.7	850	0.1	1.6	800	3.2	7.5	800	5.0	7.4	900	5.5	7.8	750	7.0	9.8
900	---	0.0	950	---	- 1.0	900	- 0.4	0.9	850	4.8	7.0	850	4.6	7.2	950	5.5	7.7	800	6.8	9.3
950	---	- 0.3	970	---	- 1.2	950	- 0.7	0.5	900	4.6	6.6	900	4.2	6.7	1000	5.4	7.4	850	6.7	8.9
1000	---	- 0.7	1000	---	- 0.8	1000	- 1.0	0.2	950	4.2	6.2	950	4.1	6.5	1050	5.0	6.8	900	6.3	8.3
1050	---	- 1.1	1050	---	- 1.1	1050	---	- 0.4	1000	4.0	5.8	1000	3.8	6.0	1090	4.2	6.2	950	6.1	7.9
1100	---	- 1.5	1100	---	- 1.5	1100	---	- 1.0	1050	3.5	5.4	1050	3.8	5.6				1000	6.1	7.5
1105	---	- 1.6							1100	3.2	5.0	1100	3.8	5.4				1050	5.8	7.1
									1110	3.1	4.9							1100	5.8	6.8

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 579 7 May 71 0904 EST Conemaugh			Ascn 580 7 May 71 1023 EST Conemaugh			Ascn 581 10 May 71 0547 EST Conemaugh			Ascn 582 10 May 71 0729 EST Conemaugh			Ascn 583 10 May 71 0840 EST Conemaugh			Ascn 584 10 May 71 1011 EST Conemaugh			Ascn 585 11 May 71 0546 EST Conemaugh		
Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C
Sfc	10.6	11.8	Sfc	13.6	17.2	Sfc	5.4	5.4	Sfc	7.6	8.6	Sfc	10.1	12.5	Sfc	13.3	17.3	Sfc	6.8	7.2
50	10.3	11.0	50	13.1	16.7	10	4.8	4.8	50	7.0	7.8	50	9.7	11.9	50	12.6	16.5	30	6.0	6.0
90	10.3	11.0	100	12.5	15.9	50	4.8	4.8	80	7.1	7.6	100	9.6	11.8	100	12.3	16.0	50	6.6	6.6
100	10.8	11.9	150	12.3	15.7	100	5.3	5.5	100	6.9	7.7	150	9.4	11.9	150	11.8	15.5	100	7.3	7.4
150	11.0	12.5	200	12.2	15.3	150	6.1	6.9	150	6.8	7.8	200	9.0	11.4	200	11.6	15.2	150	7.2	7.9
200	10.8	12.4	250	12.0	14.8	200	6.8	8.0	200	6.8	8.2	250	8.8	10.8	250	11.3	14.8	200	7.4	8.3
250	10.4	12.2	300	11.6	14.3	250	7.3	8.8	225	6.7	8.1	300	8.6	10.6	300	11.0	14.4	250	7.8	10.2
300	10.2	12.1	350	11.3	14.1	300	7.3	8.9	240	7.2	9.0	330	8.6	11.2	350	10.6	14.0	300	10.0	13.8
350	9.9	11.7	400	11.2	13.8	350	7.3	8.7	250	7.2	9.0	350	8.4	10.6	400	10.2	13.4	350	10.4	14.3
400	9.5	11.3	450	11.5	13.0	400	7.2	8.6	300	7.3	9.0	400	8.0	10.0	450	10.2	13.2	400	10.7	14.7
450	9.3	11.2	500	10.2	12.4	450	7.1	8.4	350	7.3	9.0	450	8.0	10.2	500	10.2	13.2	450	10.6	15.0
500	9.0	10.8	550	10.1	12.0	500	6.9	8.1	400	7.3	9.0	500	7.8	10.0	550	9.8	12.6	480	10.8	15.4
550	8.7	10.6	600	9.0	11.8	550	6.8	8.0	450	7.5	9.3	530	7.8	10.2	600	9.3	12.0	500	10.9	15.4
600	8.4	10.1	650	9.5	11.3	580	6.8	8.1	500	7.5	9.4	550	7.6	10.0	650	8.7	11.2	550	10.9	15.2
650	8.2	9.8	700	8.9	10.8	600	7.0	8.4	550	7.5	9.6	600	6.4	9.8	700	8.6	10.9	600	10.8	15.2
700	7.9	9.9	750	8.0	10.5	650	7.1	8.6	575	7.5	9.8	650	7.1	9.4	750	8.4	10.7	650	10.5	15.0
750	7.7	9.7	800	7.6	9.8	700	6.9	8.4	600	7.4	9.7	700	7.1	9.3	800	8.1	10.3	700	10.2	14.6
800	7.2	9.2	850	7.3	9.4	750	6.7	8.2	650	7.2	9.4	750	6.8	9.0	850	7.3	9.6	750	10.0	14.2
850	7.0	8.8	900	6.6	9.0	800	6.3	7.7	700	6.9	9.0	800	6.6	9.0	900	7.0	9.0	800	9.8	13.8
900	6.6	8.3	950	6.2	8.6	850	6.1	7.3	750	6.7	8.7	850	6.3	8.7	950	6.9	8.8	850	9.6	13.4
950	6.2	8.0	1000	5.9	8.2	900	5.7	6.8	800	6.4	8.3	900	6.1	8.5	1000	6.5	8.3	900	9.3	13.1
1000	5.9	7.8	1050	5.6	7.6	950	5.4	6.4	850	6.0	7.8	950	5.6	7.9	1050	6.2	7.8	950	9.0	12.7
1050	5.7	7.3	1100	5.3	7.1	1000	5.1	6.0	900	5.7	7.5	1000	5.4	7.6	1100	6.0	7.5	1000	8.7	12.3
1100	5.2	6.8				1050	4.8	5.8	950	5.2	7.0	1050	5.1	7.3	1135	5.7	7.1	1050	8.3	11.8
1140	5.1	6.6				1100	4.5	5.5	1000	5.0	6.7	1100	4.9	6.8				1100	8.0	11.4
						1120	4.4	5.4	1050	4.8	6.4	1120	4.8	6.6				1110	8.0	11.3
									1100	4.4	6.0									
									1130	4.1	5.7									

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 586 11 May 71 0816 EST Conemaugh			Ascn 587 11 May 71 0929 EST Conemaugh			Ascn 588 11 May 71 1150 EST Conemaugh			Ascn 589 14 May 71 0549 EST Conemaugh			Ascn 590 14 May 71 0707 EST Conemaugh			Ascn 591 14 May 71 0920 EST Conemaugh			Ascn 592 14 May 71 1027 EST Conemaugh		
Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C
Sfc	13.2	14.2	Sfc	15.6	20.8	Sfc	16.8	23.0	Sfc	5.7	6.2	Sfc	7.4	8.2	Sfc	10.4	12.6	Sfc	11.4	13.8
50	11.2	12.6	50	14.8	20.4	50	15.5	21.9	50	5.6	6.2	50	7.0	7.9	50	9.9	12.0	50	11.1	13.7
85	10.8	12.2	100	14.3	19.9	100	15.1	21.6	100	5.7	6.3	100	6.8	7.7	100	9.5	11.6	100	10.9	13.3
100	10.8	12.4	150	14.0	19.6	150	14.9	21.3	150	5.5	6.1	150	6.7	7.5	150	9.3	11.3	150	10.4	12.7
120	10.9	12.5	200	13.7	19.1	200	14.6	21.0	200	5.3	5.8	200	6.3	7.1	200	9.1	11.1	200	9.8	11.8
150	11.6	14.8	250	13.4	18.6	250	14.4	20.6	250	5.0	5.4	250	6.1	6.7	250	8.8	10.6	250	9.4	11.4
200	12.0	16.2	300	13.3	18.4	300	14.0	20.0	300	5.2	5.7	300	5.7	6.3	300	8.4	10.0	300	9.3	11.2
250	11.8	16.0	350	12.9	17.9	350	13.7	19.5	350	5.5	6.4	350	5.5	6.0	350	8.0	9.5	350	9.3	11.1
300	11.7	15.8	400	12.5	17.4	400	13.4	19.1	375	5.7	6.8	400	5.5	6.2	400	7.8	9.2	400	8.9	10.8
350	11.6	15.9	450	12.1	16.9	450	13.1	18.6	400	5.4	6.6	450	5.4	6.3	450	7.3	8.6	450	8.5	10.0
400	11.5	15.7	500	11.7	16.5	500	13.6	18.0	450	5.6	6.9	500	5.4	6.3	500	7.1	8.3	500	8.0	9.3
450	11.2	15.4	550	11.5	16.1	550	12.2	17.4	500	5.5	6.9	550	5.3	6.3	550	6.7	7.8	535	8.0	9.5
500	11.1	15.2	600	11.4	15.7	600	12.0	17.0	550	5.5	6.9	600	5.2	6.3	600	6.4	7.4	550	8.8	9.2
550	10.8	15.1	650	10.8	15.1	650	11.5	16.4	600	5.2	6.6	650	5.2	6.4	650	6.1	7.1	600	7.5	8.5
585	10.8	15.4	700	10.4	14.6	700	11.2	16.0	650	5.4	7.2	700	5.2	6.8	700	5.7	6.6	650	7.2	8.1
600	10.8	15.3	750	10.1	14.0	750	10.8	15.4	700	5.6	7.6	750	5.3	7.2	750	5.4	6.3	700	6.8	7.6
650	10.7	15.0	800	9.7	13.5	800	10.4	14.8	750	5.9	7.9	790	5.4	7.4	800	5.0	5.8	750	6.3	7.1
700	10.4	14.6	850	9.4	13.1	850	10.1	14.5	800	6.1	8.1	800	5.6	8.4	830	4.9	5.8	800	6.3	7.3
750	10.1	14.2	900	9.0	12.6	900	10.8	14.0	850	5.9	8.0	850	5.5	8.3	850	5.2	7.0	850	6.0	7.6
800	9.6	13.8	950	8.8	12.2	950	9.5	13.5	900	5.7	7.9	900	5.3	8.2	870	5.8	8.3	900	6.2	8.5
850	9.3	13.4	1000	8.4	11.6	1000	9.1	12.9	950	5.4	7.8	950	5.1	8.1	900	6.0	8.6	950	6.2	8.6
900	9.0	13.0	1050	8.3	11.4	1050	8.7	12.4	1000	5.1	7.7	1000	4.8	7.7	950	5.6	8.5	980	6.1	8.7
950	8.8	12.6	1100	7.6	11.0	1080	8.5	12.1	1050	4.9	7.5	1050	4.6	7.3	1000	5.4	8.2	1000	5.9	8.6
1000	8.4	12.2							1080	4.8	7.3	1100	4.3	7.1	1050	5.1	7.9	1050	5.7	8.4
1050	8.2	11.8													1100	4.7	7.5	1100	5.4	8.0
1100	7.9	11.3																		
1115	7.8	11.2																		

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 593 14 May 71 1219 EST Conemaugh			Ascn 594 15 May 71 0554 EST Conemaugh			Ascn 595 15 May 71 0722 EST Conemaugh			Ascn 596 15 May 71 0910 EST Conemaugh			Ascn 597 15 May 71 1024 EST Conemaugh			Ascn 598 17 May 71 0932 EST Conemaugh			Ascn 599 17 May 71 1123 EST Conemaugh		
Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C
Sfc	13.2	16.4	Sfc	6.6	6.8	Sfc	8.4	10.0	Sfc	14.2	17.8	Sfc	16.0	20.6	Sfc	14.3	16.2	Sfc	15.6	19.4
50	12.8	16.0	20	6.0	6.1	50	7.8	8.8	50	13.2	16.6	50	15.4	20.1	50	13.9	15.8	50	14.8	18.4
100	12.6	15.8	50	5.9	6.1	100	7.5	8.8	100	12.7	16.5	100	15.0	19.6	100	13.6	15.4	100	14.3	17.8
150	12.1	15.1	60	5.9	6.1	150	7.5	9.1	150	12.7	16.4	150	14.7	19.2	150	13.3	15.0	150	14.0	17.4
200	11.8	14.6	100	6.2	7.1	200	9.4	12.8	200	12.6	16.4	200	14.4	18.8	200	13.0	14.5	200	13.8	17.0
250	11.5	14.1	150	6.9	8.2	250	10.3	13.9	250	12.3	16.0	250	13.9	18.2	250	12.7	14.0	250	13.6	16.8
300	11.3	13.9	175	8.2	10.0	300	10.4	14.0	300	12.3	16.0	300	13.7	17.9	300	12.4	13.5	300	13.2	16.2
350	11.0	13.5	200	9.4	13.2	350	10.7	14.4	350	12.1	15.6	350	13.5	17.5	350	12.2	13.2	350	12.9	15.8
400	10.6	13.0	250	10.2	14.0	400	10.8	14.4	400	11.7	15.3	400	13.2	17.0	400	12.0	12.8	400	13.1	16.1
450	10.2	12.3	300	10.3	14.1	450	10.9	14.4	450	11.4	14.9	450	12.9	16.5	450	11.7	12.4	450	12.4	15.2
500	9.8	11.8	350	10.4	14.2	500	10.9	14.3	500	11.0	14.4	500	12.6	16.1	500	11.4	12.0	500	11.9	14.5
550	9.3	11.4	400	10.3	14.0	550	11.2	14.4	550	10.8	14.0	550	12.2	15.6	550	11.1	11.5	550	11.5	13.8
600	9.0	10.7	450	10.9	14.6	600	11.4	14.4	600	10.5	13.6	600	11.8	15.0	600	10.4	11.2	600	11.1	13.4
650	8.8	10.4	500	11.6	14.8	650	11.2	14.0	650	10.3	13.4	650	11.4	14.5	650	10.0	10.6	650	11.0	13.0
700	8.5	10.0	550	11.7	14.6	700	11.0	13.6	700	10.1	13.1	700	11.1	14.0	700	9.8	10.3	700	10.5	12.4
750	7.9	9.4	600	11.6	14.3	750	10.8	13.2	750	10.1	12.9	750	10.8	13.5	750	9.5	9.8	750	10.3	12.0
800	7.6	9.1	650	11.6	14.2	800	10.5	12.7	800	10.0	12.7	800	10.4	13.0	760	9.5	9.7	800	9.6	11.8
850	7.2	8.5	700	10.3	13.7	850	10.2	12.2	850	9.8	12.3	850	10.1	12.5	800	9.1	10.0	850	9.2	11.4
900	7.0	8.2	750	11.0	13.2	900	9.9	11.8	900	9.7	12.0	900	10.7	12.0	850	8.4	10.3	900	8.8	10.7
950	6.6	8.0	800	10.8	12.8	950	9.6	11.4	950	9.4	11.5	950	9.3	11.5	900	8.2	10.6	950	8.7	10.2
1000	6.2	7.4	850	10.5	12.3	1000	9.3	10.9	1000	9.0	11.0	1000	8.9	11.0	950	7.7	10.4	1000	8.5	9.6
1050	6.0	6.8	900	10.2	11.8	1050	8.9	10.4	1050	8.8	10.7	1050	8.7	10.6	1000	7.4	10.2	1050	8.1	9.3
1090	5.8	6.6	950	9.9	11.4	1100	8.7	10.1	1100	8.5	10.2	1100	8.4	10.6	1050	7.1	9.9	1095	7.8	8.8
			1000	9.5	10.9	1120	8.6	9.9	1120	8.4	10.0	1125	8.2	10.1	1095	7.0	9.6			
			1050	9.4	10.5															
			1100	9.0	10.1															

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 600 19 May 71 0544 EST Conemaugh			Ascn 601 19 May 71 0729 EST Conemaugh			Ascn 602 19 May 71 0844 EST Conemaugh			Ascn 603 20 May 71 0726 EST Conemaugh			Ascn 604 20 May 71 0841 EST Conemaugh			Ascn 605 20 May 71 0928 EST Conemaugh			Ascn 606 20 May 71 1125 EST Conemaugh		
Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C
Sfc	13.7	13.7	Sfc	15.2	16.2	Sfc	19.2	22.2	Sfc	16.9	16.9	Sfc	18.8	20.0	Sfc	19.2	21.4	Sfc	20.6	23.6
15	12.9	13.0	50	14.5	15.3	50	18.0	21.2	50	16.2	16.2	50	18.0	19.2	50	18.6	20.9	50	20.1	23.1
50	13.2	13.4	100	14.9	16.2	100	17.9	21.5	100	15.8	15.8	100	17.5	18.8	100	18.2	20.4	100	19.6	22.6
100	13.8	14.0	150	15.5	17.6	150	17.7	21.2	150	16.1	16.3	150	17.4	18.6	150	17.9	19.9	150	19.3	22.4
150	14.2	14.5	200	15.3	17.7	200	17.4	21.0	175	17.0	17.2	200	17.3	18.3	200	17.6	19.4	200	18.8	22.0
200	16.0	17.5	250	15.9	19.3	250	17.3	21.0	200	16.4	17.3	250	17.0	18.0	250	17.3	19.1	250	18.4	21.6
250	16.6	19.4	300	16.7	21.1	300	17.6	21.4	250	16.0	17.3	300	16.7	17.7	300	17.0	18.8	300	18.1	21.2
300	18.0	22.0	325	17.4	22.4	350	17.6	22.0	300	15.8	17.0	350	16.5	17.4	350	16.8	18.3	350	17.8	20.7
350	18.3	23.0	350	17.6	22.6	375	18.4	22.8	350	15.6	16.8	400	16.3	16.9	400	16.5	17.7	400	17.6	20.4
385	18.2	22.8	400	18.1	23.1	400	18.1	23.1	400	15.4	16.6	450	16.0	16.6	450	16.1	17.2	450	17.2	19.8
400	18.3	22.9	450	18.2	23.4	415	18.1	23.7	450	15.1	16.3	500	15.6	16.2	500	15.7	16.7	500	16.6	19.2
450	18.8	23.5	500	17.7	23.2	450	17.9	23.4	500	14.9	16.3	550	15.5	16.0	550	15.5	16.2	550	16.1	18.4
500	18.8	23.8	550	17.6	23.0	500	17.7	23.3	550	14.9	16.4	600	15.2	15.7	600	15.1	15.7	600	16.1	18.3
515	18.7	23.9	600	17.2	22.6	550	17.3	22.8	600	15.0	16.5	650	14.9	15.3	650	14.8	15.4	650	15.8	17.8
550	18.8	23.8	650	16.8	22.2	600	17.1	22.3	650	15.1	16.7	700	14.6	15.6	700	14.4	14.8	700	15.3	17.1
600	18.7	23.5	700	16.4	21.8	650	16.8	21.8	700	15.1	16.8	750	14.5	15.8	735	14.3	14.7	750	14.8	16.3
650	18.4	23.2	750	15.9	21.4	700	16.5	21.3	750	15.1	17.1	800	14.7	16.3	750	14.3	15.0	800	14.5	16.0
700	18.2	22.8	800	15.6	21.0	750	16.2	20.7	800	14.9	16.9	850	15.0	16.8	800	14.2	15.2	850	14.1	15.6
750	17.7	22.3	850	15.3	20.6	800	15.8	20.3	850	14.9	17.0	900	14.6	16.6	850	15.1	15.6	900	13.3	15.3
800	17.5	21.9	900	15.9	20.1	850	15.5	19.7	900	14.7	16.9	950	14.5	16.3	900	14.0	15.4	950	13.2	14.6
850	17.2	21.5	950	14.4	19.6	900	15.1	19.2	950	14.5	16.7	1000	14.2	15.9	930	13.7	15.0	1000	13.0	14.1
900	16.8	21.0	1000	14.1	19.1	950	14.6	18.8	1000	14.3	16.5	1050	13.9	15.5	950	13.9	15.5	1050	12.9	13.6
950	16.5	20.5	1050	13.9	18.7	1000	14.5	18.3	1050	13.9	16.1	1100	13.7	15.2	1000	13.7	15.2	1100	12.7	13.2
1000	16.2	20.1	1095	13.7	18.3	1050	14.2	17.8	1100	13.9	15.8	1110	13.6	15.0	1050	13.3	14.7			
1050	15.9	19.6				1100	13.8	17.2							1100	13.1	14.3			
1095	15.7	19.3													1120	13.0	14.2			

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 607 18 Oct 71 0655 EST Conemaugh			Ascn 608 18 Oct 71 0809 EST Conemaugh			Ascn 609 18 Oct 71 0938 EST Conemaugh			Ascn 610 18 Oct 71 1105 EST Conemaugh			Ascn 611 19 Oct 71 0630 EST Conemaugh			Ascn 612 19 Oct 71 0816 EST Conemaugh			Ascn 613 19 Oct 71 0928 EST Conemaugh		
Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C
Sfc	12.2	13.2	Sfc	12.8	13.8	Sfc	13.0	15.5	Sfc	14.4	17.8	Sfc	8.4	8.4	Sfc	9.8	10.6	Sfc	13.7	16.2
50	12.0	13.2	50	11.9	13.4	50	12.3	14.6	50	13.6	17.2	20	8.2	8.2	50	9.7	10.3	50	13.7	16.0
80	12.2	13.7	100	11.7	13.1	100	12.3	14.4	100	13.1	16.7	50	8.6	8.9	100	10.6	12.8	100	14.4	18.2
100	12.0	13.5	150	11.4	12.8	150	11.8	13.7	150	12.8	16.3	100	9.3	10.5	140	10.4	12.5	150	13.2	18.6
150	11.9	13.3	200	11.3	12.6	200	11.5	13.2	200	12.7	16.1	135	9.5	10.8	150	12.2	15.8	200	12.6	18.6
200	11.6	12.9	250	10.8	12.0	250	11.1	12.8	250	12.3	15.5	150	9.8	11.4	200	11.8	16.6	250	12.4	18.4
250	11.4	12.5	290	11.0	12.9	300	10.8	12.3	300	12.0	15.2	180	11.7	16.1	250	12.2	17.2	300	12.0	18.2
300	11.1	12.1	300	10.2	11.8	350	10.5	11.9	350	11.7	14.8	200	11.8	16.4	300	12.0	17.4	350	11.8	18.6
350	10.7	11.7	350	10.2	11.2	400	10.4	11.6	400	11.4	14.3	250	12.1	16.5	350	12.2	17.8	400	11.5	18.3
400	10.5	11.4	400	10.1	11.0	450	10.1	11.7	450	11.0	13.8	300	12.1	16.7	400	12.2	18.6	450	11.5	18.4
450	10.3	12.3	430	9.9	10.6	500	10.0	11.6	500	10.5	13.3	350	12.4	17.2	450	12.4	18.4	500	12.9	19.3
500	11.2	13.8	450	10.0	11.8	550	9.4	10.5	550	10.3	13.0	400	12.5	17.5	500	13.6	20.4	535	11.8	18.0
550	11.1	14.7	500	9.8	11.6	600	9.0	10.3	600	9.8	12.4	450	12.9	17.6	550	13.8	20.6	550	13.2	19.0
560	10.9	14.2	520	9.3	10.3	650	8.6	9.8	650	9.7	12.1	490	12.4	16.7	600	13.9	20.9	575	13.5	20.2
600	9.9	11.5	550	9.2	10.2	700	7.9	9.5	700	9.2	11.8	500	12.9	17.4	630	13.9	21.0	600	13.7	20.3
650	9.5	10.9	590	8.8	9.4	750	8.1	10.7	750	8.8	12.0	550	13.9	19.6	650	13.8	20.8	650	13.7	20.3
700	9.1	10.5	600	10.1	10.8	800	7.7	10.2	800	8.0	11.6	600	13.9	20.6	700	13.6	20.6	700	13.8	20.7
750	8.8	10.2	630	9.5	10.5	850	7.8	12.4	840	8.2	10.9	650	14.0	20.8	750	13.6	20.5	750	14.0	21.0
800	9.2	11.8	650	9.8	13.4	900	7.4	12.8	850	9.0	12.3	700	13.7	20.6	800	13.4	20.2	800	13.9	21.2
850	9.5	12.4	700	9.0	13.0	950	8.3	15.4	900	8.7	12.5	750	13.8	20.6	850	13.4	20.1	850	13.5	20.9
900	8.8	12.6	750	8.7	11.1	1000	8.8	15.6	950	7.3	13.3	800	13.5	20.5	900	13.3	20.2	900	13.5	20.8
950	9.5	14.0	780	8.7	12.8	1050	8.4	15.1	1000	7.6	14.2	850	13.6	20.5	915	13.3	20.4	950	13.3	20.6
960	9.6	14.4	800	8.6	12.8	1080	8.5	15.3	1050	7.9	14.6	900	13.5	20.5	950	13.0	20.2	1000	13.2	20.3
980	9.0	13.3	850	8.4	12.8				1085	6.2	13.5	950	13.3	20.5	1000	12.7	19.8	1050	12.9	19.8
1000	9.4	13.8	900	8.1	12.9							1000	13.1	20.2	1050	12.5	19.5	1080	12.8	19.8
1050	9.7	14.6	950	7.8	12.6							1050	13.1	20.1	1085	12.6	19.6			
			1000	7.7	12.4							1100	12.7	19.5						
			1050	8.1	13.0							1150	12.8	19.4						
			1060	8.5	13.7							1200	12.5	19.0						
												1250	12.3	18.7						
												1290	12.1	18.6						

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 614 19 Oct 71 1111 EST Conemaugh			Ascn 615 19 Oct 71 1316 EST Conemaugh			Ascn 616 20 Oct 71 0637 EST Conemaugh			Ascn 617 20 Oct 71 0756 EST Conemaugh			Ascn 618 20 Oct 71 0942 EST Conemaugh			Ascn 619 20 Oct 71 1044 EST Conemaugh			Ascn 620 21 Oct 71 0635 EST Conemaugh		
Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C
Sfc	17.3	23.9	Sfc	19.3	26.1	Sfc	12.7	14.3	Sfc	13.2	15.0	Sfc	14.5	16.9	Sfc	15.9	18.6	Sfc	11.2	11.5
50	16.3	23.2	50	18.2	25.4	15	12.8	14.6	50	13.0	14.8	50	14.2	16.4	50	14.8	17.7	20	10.8	11.0
100	16.1	22.8	100	17.7	24.9	50	12.6	14.2	100	12.6	14.3	100	13.6	15.8	100	14.5	17.0	50	11.7	13.0
150	15.6	22.3	150	17.6	24.7	100	12.2	13.5	150	12.3	13.8	150	13.0	15.2	150	14.2	16.6	100	12.0	13.3
200	15.6	22.2	200	17.2	24.1	150	12.1	13.3	200	12.2	13.6	200	13.0	14.9	200	14.1	16.4	150	12.0	13.5
250	15.0	21.6	250	16.8	23.6	200	11.8	13.0	250	11.8	13.1	250	12.6	14.4	250	13.6	15.8	200	12.1	13.6
300	14.8	21.1	300	16.7	23.3	250	11.5	12.6	300	11.4	12.6	300	12.4	14.0	300	13.4	15.4	250	12.0	13.3
350	14.5	20.7	350	16.3	22.8	300	11.3	12.3	350	11.2	12.2	350	12.2	13.7	350	12.9	14.9	300	11.7	12.9
400	14.1	20.3	400	16.0	22.4	350	11.1	12.0	400	11.1	12.1	400	11.9	13.3	400	12.3	14.2	350	11.5	12.6
450	13.9	19.9	450	15.7	21.9	400	10.7	11.6	450	10.5	11.4	450	11.7	12.9	450	12.1	13.7	400	11.2	12.2
500	13.6	19.5	500	15.2	21.4	450	10.3	10.9	500	10.5	11.2	500	11.5	12.5	500	11.8	13.2	450	11.5	13.9
550	13.0	18.8	550	14.9	20.9	500	10.2	10.6	550	10.2	10.9	550	11.0	12.0	550	11.6	13.0	480	11.3	13.2
600	12.8	18.3	600	14.6	20.4	525	10.0	10.4	600	9.9	10.5	600	10.7	11.6	600	11.4	12.7	500	11.3	14.1
650	13.4	18.7	650	14.2	19.8	550	10.0	10.7	650	10.0	10.9	650	10.4	11.2	650	11.1	12.2	550	11.2	15.0
700	12.3	17.5	700	13.8	19.4	600	9.5	9.8	700	9.5	10.3	700	10.1	10.8	700	10.8	11.8	600	11.4	15.9
750	13.3	19.4	750	13.5	19.0	650	9.4	9.6	750	9.3	10.2	750	9.7	10.3	750	10.5	11.4	620	11.2	15.8
780	13.1	19.6	800	13.1	18.5	700	9.2	9.4	790	9.2	9.8	800	9.5	10.0	800	10.1	10.9	650	11.8	17.4
790	12.5	18.0	850	13.0	18.2	750	9.4	11.0	800	9.1	10.2	830	9.4	10.8	850	9.9	10.5	700	11.8	19.2
800	13.1	18.9	900	12.4	18.2	800	10.5	13.1	850	9.8	12.4	850	9.0	9.5	900	9.7	10.6	750	12.0	19.2
840	12.9	19.2	950	12.4	18.0	850	10.6	13.6	900	10.5	15.0	900	9.8	13.4	950	10.0	11.6	800	11.9	19.4
850	12.6	18.9	980	12.0	17.2	900	10.6	14.2	950	11.8	15.4	950	9.5	14.4	1000	9.9	14.8	850	11.7	19.5
900	12.4	18.5	1000	12.3	19.3	935	11.9	17.8	970	11.5	16.7	1000	9.7	15.4	1050	9.7	15.4	880	11.9	20.1
950	12.9	19.6	1050	11.6	18.6	950	11.8	18.0	1000	11.9	16.2	1050	10.2	15.6	1100	9.6	15.4	900	11.7	19.9
1000	12.5	19.5	1085	11.7	18.5	1000	12.1	18.6	1050	11.4	18.4				1150	10.1	15.8	950	12.0	20.2
1045	12.3	19.2				1050	12.1	19.1	1080	11.0	18.4				1200	10.0	16.2	1000	11.8	20.0
						1100	12.1	19.6							1240	10.0	16.3	1050	11.9	19.8
						1125	12.2	20.0										1100	11.6	19.4
						1150	12.2	19.7										1150	11.4	19.0
						1200	11.8	19.2										1200	11.4	18.8
						1250	12.0	19.4										1250	10.9	18.4
						1300	11.9	19.5												
						1350	11.8	19.4												

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 621 21 Oct 71 0832 EST Conemaugh			Ascn 622 21 Oct 71 0956 EST Conemaugh			Ascn 623 22 Oct 71 0632 EST Conemaugh			Ascn 624 22 Oct 71 0810 EST Conemaugh			Ascn 625 22 Oct 71 0944 EST Conemaugh			Ascn 626 22 Oct 71 1048 EST Conemaugh			Ascn 627 2 Nov 71 0707 EST Conemaugh		
Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C
Sfc	12.6	13.8	Sfc	15.7	18.2	Sfc	15.8	17.4	Sfc	16.2	17.8	Sfc	17.2	19.5	Sfc	17.8	20.2	Sfc	22.8	24.5
25	12.1	13.1	50	15.0	17.5	50	15.5	17.2	50	15.6	17.4	50	16.8	19.0	50	17.2	19.4	50	22.4	24.2
50	12.1	13.3	100	14.8	17.3	100	15.4	16.9	100	15.5	17.1	100	16.5	18.6	100	16.9	19.0	100	22.4	24.4
100	12.0	13.5	150	14.6	17.0	150	15.2	16.6	150	15.1	16.7	150	16.3	18.2	150	16.7	18.6	150	22.2	24.2
150	12.1	13.7	200	14.2	16.6	200	14.9	16.2	200	15.1	16.4	200	15.9	17.8	200	16.5	18.4	200	21.6	23.4
200	12.2	14.0	250	14.0	16.1	250	15.0	16.5	250	14.9	16.1	250	15.7	17.3	250	16.2	18.0	250	21.6	23.4
250	12.3	14.2	300	13.6	15.8	300	14.6	15.6	300	14.7	15.8	300	15.5	17.1	300	15.9	17.5	300	21.2	22.7
300	12.5	14.3	350	13.6	15.8	350	14.5	15.6	350	14.4	15.4	350	15.2	16.6	350	15.5	17.0	320	21.2	22.5
350	12.5	14.3	400	13.6	15.8	400	14.1	15.0	400	14.3	15.3	400	15.0	16.2	400	15.2	16.6	350	21.2	22.8
400	12.4	14.3	450	13.4	15.7	450	14.3	15.5	450	14.0	14.8	450	14.6	15.8	450	15.1	16.2	400	20.9	22.3
450	12.3	14.2	500	13.1	15.6	500	14.1	15.4	500	13.5	14.3	500	14.4	15.4	500	14.7	15.8	450	20.7	21.9
500	12.4	16.0	550	13.5	17.4	525	14.2	15.7	550	13.7	14.4	550	14.2	15.1	550	14.4	15.4	500	20.5	21.6
550	12.4	16.9	600	12.9	18.2	550	13.9	15.2	600	13.5	14.3	600	13.9	14.6	600	14.3	15.1	550	20.1	21.1
600	12.3	17.4	650	12.6	18.6	600	13.8	14.9	650	13.4	14.4	650	13.6	14.1	650	14.0	14.7	600	19.9	20.8
650	12.1	17.7	700	12.3	18.7	650	13.5	14.7	700	13.2	14.1	700	13.3	13.7	700	13.6	14.2	650	19.6	20.2
700	11.9	17.7	750	12.0	19.2	700	13.3	14.1	750	12.9	13.9	750	13.1	13.6	750	13.4	14.0	700	19.3	19.8
750	11.9	18.8	800	11.8	19.4	750	13.0	13.7	800	12.7	13.5	800	13.0	13.6	800	13.4	14.4	720	19.2	19.6
800	11.7	19.0	850	11.6	19.2	800	12.8	13.5	850	12.3	13.0	830	12.8	13.4	850	13.2	14.6			
850	11.5	19.2	900	11.6	19.6	850	12.5	13.1	900	12.3	13.1	850	13.0	13.8	900	12.7	14.4			
900	11.5	19.2	930	11.6	19.8	900	12.3	12.9	950	12.3	13.6	900	12.7	13.9	950	12.4	14.4			
950	11.4	19.3	950	11.3	19.5	950	12.3	13.8	1000	11.7	13.8	950	12.2	13.9	1000	12.2	14.2			
1000	11.1	19.1	1000	11.4	19.4	1000	12.0	13.5	1050	11.4	13.8	1000	11.3	14.5	1050	12.1	14.1			
1050	11.1	19.0	1050	11.4	19.2	1050	11.8	13.5	1090	11.0	13.8	1050	10.9	14.2	1100	11.8	13.8			
1070	11.1	18.9	1100	11.4	19.2	1085	11.5	13.3				1100	10.6	14.0						
			1125	11.2	19.0							1110	10.5	13.9						

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 628 2 Nov 71 0902 EST Conemaugh			Ascn 629 3 Nov 71 0904 EST Conemaugh			Ascn 630 3 Nov 71 1025 EST Conemaugh			Ascn 631 3 Nov 71 1225 EST Conemaugh			Ascn 632 3 Nov 71 1306 EST Conemaugh			Ascn 633 4 Nov 71 0714 EST Conemaugh			Ascn 634 4 Nov 71 0815 EST Conemaugh		
Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C
Sfc	23.4	24.9	Sfc	11.1	12.5	Sfc	11.3	13.4	Sfc	11.2	14.1	Sfc	11.3	14.5	Sfc	3.1	4.5	Sfc	3.2	4.7
50	22.5	24.8	50	10.8	12.2	50	10.6	12.8	50	10.8	13.8	50	10.8	14.1	20	3.2	4.7	50	3.4	4.6
100	22.3	24.6	100	10.6	11.8	100	10.2	12.4	100	10.5	13.5	100	10.4	13.8	50	3.2	4.6	100	3.2	4.2
150	22.0	24.2	150	10.3	11.4	150	10.0	12.0	150	10.3	13.2	150	10.2	13.4	100	2.9	4.3	150	2.8	3.8
200	21.7	23.8	200	10.0	11.0	200	9.6	11.5	200	10.0	12.8	200	9.8	12.9	150	2.8	3.9	200	2.6	3.4
250	21.6	23.4	250	9.6	10.6	250	9.2	11.0	250	9.7	12.3	250	9.4	12.4	200	2.6	3.6	250	2.3	3.0
300	21.2	23.0	300	9.4	10.2	300	9.0	10.7	300	9.5	12.1	300	9.0	12.0	250	2.2	3.2	300	1.9	2.5
350	20.8	22.6	350	9.1	9.8	350	8.7	10.2	350	9.3	11.6	350	8.8	11.6	300	2.0	2.8	350	1.4	2.0
400	20.4	22.3	400	8.8	9.6	400	8.5	9.8	400	9.1	11.3	400	8.5	11.1	350	1.6	2.4	400	0.9	1.5
450	20.2	21.6	450	8.4	9.2	450	7.9	9.4	450	8.6	10.6	450	8.1	10.6	400	1.3	2.0	450	0.4	1.0
500	20.0	21.3	500	8.2	8.9	500	7.9	8.9	500	8.0	9.9	500	7.6	10.1	450	1.0	1.6	500	0.1	0.6
550	19.7	20.8	550	7.9	8.6	550	7.5	8.3	550	7.7	9.5	550	7.4	9.7	500	0.5	1.1	550	---	0.2
600	19.3	20.3	600	7.6	8.3	600	7.0	8.1	600	7.3	9.0	600	7.1	9.3	550	0.2	0.7	600	---	- 0.4
650	19.0	19.8	650	7.4	8.1	650	6.7	7.5	650	7.2	8.6	650	6.4	8.7	600	- 0.3	0.2	650	---	- 0.9
700	18.7	19.5	700	7.0	7.7	700	6.4	7.1	700	6.6	8.0	700	6.5	8.3	650	---	- 0.3	700	---	- 1.4
750	18.4	19.0	750	6.6	7.4	750	6.2	6.8	750	6.3	7.6	750	6.1	7.9	700	---	- 0.7	750	---	- 1.8
800	17.9	18.8	800	6.3	7.0	800	5.7	6.5	800	6.2	7.2	800	5.9	7.5	750	---	- 1.0	800	---	- 2.3
850	17.5	18.3	850	5.9	6.6	850	5.1	6.3	850	5.7	6.8	850	5.8	7.3	800	---	- 1.5	850	---	- 2.8
900	17.3	18.2	900	5.6	6.3	900	4.9	6.0	900	5.4	6.6	900	5.6	7.1	850	---	- 1.9	900	---	- 3.2
950	17.0	17.9	950	5.2	6.0	950	4.8	5.8	950	5.0	6.2	950	5.1	6.6	900	---	- 2.4	950	---	- 3.5
1000	16.7	17.7	1000	4.6	6.3	1000	3.8	5.6	1000	4.6	5.8	1000	5.1	6.3	950	---	- 2.9	1000	---	- 3.7
1050	16.2	17.4	1050	3.8	6.5	1050	3.4	5.7	1050	4.0	5.4	1050	4.8	5.8	1000	---	- 3.2	1050	---	- 4.2
1075	16.0	17.1	1085	3.4	6.5	1085	3.0	5.7	1080	4.0	5.2	1070	4.4	5.3	1050	---	- 3.4	1100	---	- 4.1
															1075	---	- 3.4	1150	---	- 3.8
																		1200	---	- 4.4

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 635 5 Nov 71 0702 EST Conemaugh			Ascn 636 5 Nov 71 0850 EST Conemaugh C-5			Ascn 637 5 Nov 71 1011 EST Conemaugh			Ascn 638 5 Nov 71 1152 EST Conemaugh			Ascn 639 6 Nov 71 0701 EST Conemaugh			Ascn 640 6 Nov 71 0815 EST Conemaugh			Ascn 641 6 Nov 71 1025 EST Conemaugh		
Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C
Sfc	---	1.6	Sfc	---	---	Sfc	4.7	6.7	Sfc	8.2	11.4	Sfc	5.7	7.8	Sfc	5.2	5.7	Sfc	7.8	10.4
25	---	- 0.2	50	---	---	50	4.4	6.0	50	7.9	11.1	25	3.9	4.0	50	4.2	4.5	50	7.4	9.8
50	0.4	0.4	100	---	---	100	4.2	6.0	100	7.5	10.9	50	4.0	4.6	85	4.6	6.0	100	7.2	10.1
100	0.4	0.4	150	---	---	150	4.0	5.8	150	7.2	10.5	100	4.2	5.5	100	4.3	5.4	150	7.2	10.4
150	0.6	0.7	200	---	---	200	3.9	5.7	200	6.9	10.1	150	4.5	6.3	120	5.2	7.4	200	7.4	10.8
200	1.2	1.6	250	---	---	250	3.7	5.3	250	6.6	9.8	165	5.2	7.8	150	5.3	7.8	250	7.4	11.0
250	2.0	2.8	300	4.4	5.0	300	3.8	6.0	300	6.4	9.4	200	5.3	8.0	200	5.2	7.8	300	7.5	11.2
300	3.1	4.2	350	4.2	4.8	350	3.9	6.4	350	6.1	9.1	250	6.0	8.8	250	5.3	7.9	350	7.5	11.2
350	3.4	4.6	365	5.1	5.9	400	3.7	6.2	400	5.7	8.6	300	6.4	9.9	300	5.8	8.8	400	7.6	11.4
400	3.8	5.1	400	4.4	5.7	450	3.7	6.2	450	5.5	8.3	350	6.8	10.6	350	6.6	10.2	450	7.6	11.4
450	4.0	5.2	450	4.0	5.6	500	3.5	5.9	500	5.0	7.7	400	6.8	10.6	400	6.6	10.4	485	7.7	11.6
500	3.9	5.2	500	3.7	5.4	550	3.2	5.5	550	4.7	7.4	450	6.8	10.5	450	6.6	10.2	500	7.6	11.5
550	4.0	5.2	550	3.6	5.2	600	3.0	5.2	600	4.4	7.1	500	6.7	10.2	500	6.4	9.9	550	7.5	11.4
600	3.7	4.8	600	3.4	4.8	650	2.7	4.9	650	4.0	6.6	550	6.7	10.3	550	6.3	9.7	600	7.5	11.3
650	3.4	4.4	650	3.3	4.4	700	2.4	4.5	700	3.7	6.2	600	6.6	10.2	600	6.1	9.5	650	7.4	11.0
700	3.1	4.0	700	3.1	4.0	750	2.0	4.2	750	2.7	5.1	650	6.5	10.0	650	6.0	9.4	700	7.3	10.7
750	2.8	3.6	750	2.9	3.6	800	1.7	3.8	800	2.2	5.6	700	6.5	10.0	700	5.9	9.3	750	7.1	10.3
800	2.5	3.2	800	2.8	3.3	850	1.4	3.5	850	2.8	5.0	750	6.4	9.8	750	6.0	9.3	800	6.9	9.9
825	2.5	3.2	850	2.7	3.3	900	1.3	3.5	900	2.4	5.0	800	6.4	9.6	800	6.1	9.2	850	6.7	9.7
850	2.6	3.5	900	2.8	3.6	950	0.9	3.4	950	2.2	5.8	850	6.3	9.3	850	6.0	8.9	900	6.6	9.4
900	2.8	4.0	950	2.9	3.9	1000	0.8	3.6	1000	1.8	5.8	900	6.3	9.0	900	5.8	8.6	950	6.2	8.8
950	2.8	4.2	1000	2.8	3.9	1050	0.8	3.8	1050	1.8	6.0	950	6.6	8.6	950	5.7	8.3	1000	6.0	8.5
1000	2.7	4.1	1050	2.6	3.9	1080	0.8	3.8	1100	1.7	5.6	1000	5.7	8.2	1000	5.6	7.8	1050	5.9	8.2
1050	2.5	3.9	1080	2.4	3.8				1150	2.1	5.6	1050	5.4	7.8	1050	5.1	7.5	1085	5.6	7.8
1090	2.2	3.7							1200	2.4	5.4	1100	5.2	7.4	1100	5.0	7.2			
									1220	2.6	5.4									

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 642 6 Nov 71 1146 EST Conemaugh			Ascn 643 9 Nov 71 0713 EST Conemaugh			Ascn 644 9 Nov 71 0828 EST Conemaugh			Ascn 645 9 Nov 71 1026 EST Conemaugh			Ascn 646 9 Nov 71 1202 EST Conemaugh			Ascn 647 12 Nov 71 0706 EST Conemaugh			Ascn 648 12 Nov 71 0850 EST Conemaugh		
Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C
Sfc	11.7	15.2	Sfc	---	- 1.4	Sfc	---	1.0	Sfc	4.5	5.4	Sfc	5.0	7.2	Sfc	5.5	5.9	Sfc	8.6	10.4
50	11.1	14.8	20	---	- 1.8	50	---	0.9	50	4.3	4.7	50	4.9	6.3	20	4.2	4.2	50	8.4	10.2
100	10.8	14.6	50	---	- 0.6	100	---	0.6	100	4.0	4.3	100	5.0	6.2	30	5.8	7.0	100	8.1	9.8
150	10.5	14.4	100	---	0.2	150	---	0.5	150	3.5	3.7	150	5.2	6.2	50	6.7	8.2	150	7.8	9.4
200	10.3	14.1	150	---	0.2	200	---	0.3	200	3.2	3.4	200	4.6	5.6	100	6.8	8.4	200	7.7	9.2
250	10.2	14.0	200	---	0.0	250	---	0.1	250	2.7	2.9	250	4.3	5.2	150	7.1	8.6	250	7.6	9.0
300	10.0	13.8	250	---	- 0.4	300	---	- 0.5	300	2.2	2.4	300	4.0	4.8	200	7.2	8.8	300	7.2	8.8
350	9.6	13.4	300	---	- 0.6	350	---	- 0.9	350	1.8	2.0	350	3.6	4.2	250	7.3	9.0	350	7.0	8.3
400	9.3	12.9	350	---	- 0.8	400	---	- 1.2	400	1.4	1.6	400	3.3	3.9	300	7.2	8.8	400	6.8	8.2
450	9.0	12.5	400	---	- 1.4	450	---	- 1.4	450	0.7	0.9	450	2.9	3.4	350	6.9	8.3	450	6.6	8.0
500	8.7	12.1	450	---	- 1.4	500	---	- 1.5	500	0.2	0.4	500	2.2	2.7	400	6.8	8.1	500	6.5	7.8
550	8.6	11.8	500	---	- 1.5	550	---	- 1.8	550	---	0.0	550	1.8	2.2	450	6.7	8.0	550	6.6	8.0
600	8.2	11.4	550	---	- 1.6	600	---	- 1.6	600	---	- 0.5	600	1.3	1.6	500	6.6	7.8	600	6.5	7.9
650	8.0	11.1	600	---	- 1.4	650	---	- 1.9	650	---	- 0.9	650	1.0	1.2	550	6.4	7.6	650	6.2	7.4
700	7.7	10.7	650	---	- 1.4	670	---	- 1.2	700	---	- 1.3	700	0.8	0.8	600	6.1	7.5	700	6.1	7.2
750	7.4	10.2	700	---	- 1.6	680	---	- 1.0	750	---	- 1.1	750	---	0.2	650	6.0	7.5	750	5.9	7.3
800	7.1	9.8	750	---	- 1.8	700	---	- 1.0	800	---	- 1.2	800	---	- 0.2	700	5.8	7.4	800	5.5	6.9
850	6.9	9.5	800	---	- 1.5	750	---	- 1.5	850	---	- 1.3	850	---	- 0.9	750	5.6	7.1	850	5.2	6.6
900	6.6	9.1	850	---	- 2.0	800	---	- 1.4	900	---	- 1.7	900	---	- 1.8	800	5.1	6.7	900	4.9	6.5
950	6.4	8.8	870	---	- 1.8	850	---	- 1.5	950	---	- 2.2	950	---	- 2.1	850	4.9	6.5	950	4.6	6.9
1000	6.2	8.4	900	---	- 2.4	900	---	- 1.8	1000	---	- 2.5	1000	---	- 2.4	900	4.6	6.2	1000	4.2	6.7
1050	6.0	8.2	950	---	- 2.0	950	---	- 2.2	1050	---	- 2.2	1050	---	- 2.7	950	4.3	6.0	1050	4.1	6.6
1100	5.8	8.0	1000	---	- 2.2	1000	---	- 2.4	1100	---	- 2.2				1000	4.0	5.8	1080	4.0	6.6
1110	5.7	7.8	1050	---	- 2.4	1050	---	- 2.6							1050	3.8	5.7			
			1070	---	- 2.6	1070	---	- 2.6							1080	3.6	5.8			

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 649 12 Nov 71 1029 EST Conemaugh			Ascn 650 12 Nov 71 1130 EST Conemaugh			Ascn 651 13 Nov 71 0657 EST Conemaugh			Ascn 652 13 Nov 71 0850 EST Conemaugh			Ascn 653 13 Nov 71 1021 EST Conemaugh			Ascn 654 16 Nov 71 0852 EST Keystone			Ascn 655 16 Nov 71 1016 EST Keystone		
Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C	Z, m	WB, °C	T, °C
Sfc	10.8	13.6	Sfc	11.6	14.2	Sfc	12.5	15.0	Sfc	11.6	13.8	Sfc	12.0	14.6	Sfc	10.6	11.1	Sfc	10.9	12.1
50	10.3	13.3	50	10.8	13.6	50	12.4	15.0	50	11.3	13.5	50	11.6	14.1	50	10.1	10.7	50	10.5	11.7
100	9.8	12.7	100	10.7	13.4	100	12.1	14.6	100	11.0	13.2	100	11.3	13.7	100	9.8	10.4	100	10.4	11.4
150	9.5	12.2	150	10.3	12.9	150	11.9	14.3	150	10.7	12.8	150	11.1	13.4	150	9.7	10.3	150	10.0	10.9
200	9.3	11.9	200	9.9	12.5	200	11.7	14.0	200	10.4	12.4	200	10.8	13.1	190	9.9	10.9	200	9.7	10.6
250	8.9	11.4	250	9.7	12.2	250	11.4	13.5	250	10.1	11.9	250	10.6	12.8	200	9.8	10.9	240	9.6	10.7
300	8.7	11.1	300	9.4	11.6	300	11.2	13.1	300	9.8	11.4	300	10.1	12.0	250	9.6	10.7	250	9.4	10.5
350	8.5	10.7	350	8.9	11.1	350	10.9	12.6	350	9.5	11.0	350	9.9	11.7	300	9.4	10.4	300	9.2	10.2
400	8.1	10.2	400	8.7	10.8	400	10.7	12.1	400	9.1	10.5	400	9.5	11.2	350	9.1	10.2	350	8.9	9.8
450	7.7	9.7	450	8.5	10.4	450	10.2	11.6	450	8.8	10.1	450	9.0	10.8	400	9.0	10.0	400	8.6	9.4
500	7.6	9.4	500	8.0	9.8	500	10.0	11.3	500	8.4	9.5	500	8.8	10.4	450	8.8	9.9	450	8.3	9.1
550	7.0	8.8	550	7.8	9.4	550	9.6	10.7	550	8.2	9.1	550	8.5	10.1	500	8.5	9.7	500	8.0	9.0
600	6.7	8.4	600	7.4	8.9	600	9.3	10.3	600	7.9	8.7	590	8.3	9.6	550	8.2	9.4	550	7.9	8.9
650	6.4	7.9	650	7.0	8.4	650	8.9	9.8	550	7.5	8.1	600	8.5	10.0	600	7.9	9.0	600	7.6	8.6
700	5.9	7.4	700	6.6	7.8	700	8.7	9.4	700	7.2	7.8	640	8.1	9.3	650	7.6	8.6	650	7.4	8.4
750	5.9	7.5	750	6.4	7.4	750	8.4	9.0	750	7.0	7.6	650	8.1	9.5	700	7.3	8.2	700	7.0	8.0
800	5.5	6.9	800	6.1	7.0	800	8.1	8.6	800	6.9	7.4	700	8.1	9.6	750	7.0	7.8	750	6.6	7.6
850	5.3	6.6	850	5.8	6.6	850	7.8	8.1	850	6.7	7.1	750	7.9	9.4	800	6.7	7.4	800	6.3	7.1
900	5.1	6.5	900	5.5	6.3	900	7.6	7.8	900	6.5	7.0	800	7.7	9.1	850	6.3	6.9	850	5.9	6.6
930	4.8	6.4	950	5.1	6.1	950	7.4	7.6	950	6.3	6.7	850	7.4	8.8	900	6.0	6.5	900	5.6	6.2
950	4.5	6.9	1000	4.7	5.8	995	7.2	7.3	1000	6.2	6.5	900	7.3	8.5	950	5.7	6.1	950	5.3	5.8
1000	4.0	7.0	1050	4.4	5.9				1050	5.9	6.2	950	7.0	8.1	1000	5.4	5.7	1000	5.0	5.4
1050	3.7	6.8	1100	3.9	7.0							1000	6.8	7.7	1050	5.1	5.3	1050	4.7	5.0
1070	3.5	6.6	1150	3.6	6.7							1050	6.5	7.4	1070	5.0	5.2	1100	4.5	4.7
1095	3.5	6.6	1200	3.4	6.5							1100	6.6	7.5						
			1240	3.2	6.4							1150	6.1	7.2						
												1200	5.9	7.0						
												1250	5.6	6.8						

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 656 16 Nov 71 1111 EST Keystone			Ascn 657 16 Nov 71 1225 EST Keystone			Ascn 658 17 Nov 71 0704 EST Conemaugh C-3			Ascn 659 17 Nov 71 0856 EST Conemaugh C-3			Ascn 660 17 Nov 71 1002 EST Conemaugh			Ascn 661 17 Nov 71 1125 EST Conemaugh			Ascn 662 17 Nov 71 1351 EST Conemaugh		
Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C	Z, m	WB,°C	T,°C
Sfc	11.3	12.7	Sfc	11.5	13.5	Sfc	---	---	Sfc	---	---	Sfc	7.1	7.4	Sfc	11.0	12.6	Sfc	14.6	18.6
50	10.9	12.5	50	11.0	13.2	50	---	---	50	---	---	50	6.3	6.5	50	10.5	12.2	50	13.8	17.8
100	10.7	12.1	100	10.8	12.9	100	---	---	60	6.6	7.0	100	6.1	6.3	100	10.0	11.7	100	13.3	17.2
150	10.4	11.8	150	10.4	12.5	150	6.5	6.7	100	6.5	6.9	150	6.1	6.3	150	9.8	11.5	150	13.1	17.0
200	10.2	11.4	200	10.1	12.0	200	7.5	8.4	150	6.5	6.9	200	7.1	7.8	200	9.5	11.1	200	12.7	16.5
250	9.9	10.9	250	9.7	11.5	250	7.8	9.0	180	6.4	6.8	250	7.5	8.6	250	9.3	10.7	250	12.3	16.1
300	9.7	10.6	300	9.3	11.0	290	8.0	9.3	200	6.5	7.0	300	7.8	9.2	300	9.5	11.4	300	12.2	15.6
350	9.3	10.1	350	9.2	10.7	300	7.9	9.2	230	6.4	7.0	350	8.2	9.9	350	9.6	11.8	350	11.9	15.2
400	9.1	9.8	400	8.8	10.2	350	7.8	9.1	250	7.1	8.1	400	8.4	10.1	400	9.4	11.6	400	11.3	15.1
450	8.8	9.4	450	8.4	9.8	400	7.8	8.9	280	7.5	8.9	450	8.3	10.1	450	9.5	11.5	450	11.0	14.8
500	8.5	9.0	500	8.1	9.4	450	7.6	8.7	300	7.5	8.9	500	8.2	10.0	500	9.2	11.4	500	10.6	14.6
550	8.1	8.5	550	7.6	9.0	500	7.8	9.0	350	7.6	9.0	550	8.0	9.8	550	9.3	11.6	550	10.2	13.8
600	7.9	8.1	565	8.0	9.1	550	7.8	9.6	400	7.7	9.1	600	8.1	9.6	600	9.0	11.4	600	10.1	13.5
650	7.6	8.0	600	7.7	8.5	600	7.8	9.6	450	7.7	9.2	630	8.1	9.7	650	8.7	11.0	625	10.1	13.4
700	8.2	8.3	650	7.4	8.0	625	7.8	9.6	500	7.7	9.5	650	8.3	10.3	700	8.7	10.9	650	9.8	14.0
710	8.3	8.4	700	7.0	7.6	650	8.0	10.6	550	7.7	9.5	700	8.2	10.7	750	8.4	11.4	700	9.5	13.9
750	7.8	7.8	750	6.6	7.2	700	8.0	11.2	600	7.6	9.4	725	7.9	10.9	800	8.8	12.6	750	9.0	13.7
770	6.7	7.0	800	6.1	6.6	750	8.6	12.0	650	7.5	9.3	750	8.5	12.1	850	8.1	13.4	800	8.6	14.0
800	6.3	6.9	850	5.9	6.2	800	8.8	12.8	700	7.9	10.7	800	8.7	12.9	900	8.0	13.7	850	8.5	14.3
850	6.0	6.5	900	5.6	5.8	850	8.4	13.4	750	8.4	11.9	850	8.0	13.3	950	7.9	13.7	900	8.3	14.3
900	5.7	6.1	950	5.4	5.6	900	8.1	13.5	800	8.6	12.5	900	7.7	13.5	1000	7.9	13.9	950	8.2	14.2
950	5.4	5.7				950	8.0	13.6	850	8.2	12.9	950	7.7	13.6	1050	7.9	14.2	1000	8.1	14.3
1000	5.0	5.2				1000	8.0	13.8	900	7.6	13.2	1000	7.8	13.8	1100	7.9	14.2	1050	8.1	14.2
1050	4.7	4.9				1050	8.1	14.1	950	7.6	13.4	1050	7.8	13.8				1095	8.0	14.0
1075	4.7	4.8				1100	8.0	14.2	1000	7.8	13.6	1100	7.6	13.7						
						1150	7.8	14.0	1050	7.8	13.8	1150	7.6	13.5						
						1200	7.7	13.9	1100	7.6	13.7	1185	7.6	13.4						
						1250	7.7	13.7	1150	7.6	13.5									
						1260	7.7	13.6	1200	7.5	13.4									
									1250	7.2	13.2									
									1265	7.4	13.2									

Table 8. (continued) HELICOPTER TEMPERATURE PROFILES

Ascn 663
17 Nov 71
1554 EST
Conemaugh

Z, m	WB,°C	T,°C
Sfc	14.8	19.4
50	14.4	19.0
100	14.2	18.9
150	13.9	18.5
200	13.7	18.2
250	13.4	17.8
300	13.0	17.2
350	12.8	16.9
400	12.5	16.4
450	12.2	15.9
500	11.8	15.4
550	11.6	15.0
600	11.3	14.6
650	11.1	14.1
700	10.8	13.8
750	10.7	13.7
800	10.4	13.4
850	10.1	13.5
900	8.8	13.4
930	8.5	13.4
950	8.2	13.5
1000	8.1	13.6
1050	7.9	13.6
1100	7.9	13.7
1150	7.6	13.4
1200	7.7	13.3
1235	7.4	13.0

PILOT BALLOON MEASUREMENTS

Pilot balloon measurements of winds aloft were made at the Conemaugh or Keystone Station during all LAPPES experiments. Depending on prevailing meteorological conditions and the length of flights, as few as three and as many as ten ascensions per series day were made, usually at 30-minute intervals. Most of the pilot balloons were tracked using the double-theodolite technique; when fog prevented visibility between sites, single-theodolite releases were made. Similarly, when one observer lost the balloon prematurely, the computer calculated the remaining portion of the run based on observations from a single theodolite, using the previously determined double-theodolite ascension rate.

Table 9 lists the winds aloft in increments of 50 meters above Conemaugh or Keystone stack-base elevation, up to a maximum height of 1500 meters. The wind speed and direction for each level were obtained from the original data by interpolating between the 30-second readings.

Table 9. PILOT BALLOON MEASUREMENTS

Legend

Ascn : Letter designates release point, i.e., C = Conemaugh; K = Keystone. Ascensions consecutively numbered beginning with 1 each day.
EST : Release time of pilot balloon.
Single : Balloon tracked by one theodolite; standard ascension rate.
Double : Balloon tracked by two theodolites; calculated ascension rate.
Combined : Ascension started as double but terminated as single; calculated ascension rate for double portion extrapolated for single portion.
Z, m : Height above Conemaugh or Keystone stack base elevation in whole meters.
D, deg : Wind direction in degrees of azimuth to nearest tenth.
S, mps : Wind speed in meters per second to nearest tenth.
Sfc : Surface wind direction and speed determined by portable anemometer.

Table 9. PILOT BALLOON MEASUREMENTS

	Ascn C-1 21 Apr 71 0740 EST Single		Ascn C-2 21 Apr 71 0810 EST Double		Ascn C-3 21 Apr 71 0830 EST Double		Ascn C-4 21 Apr 71 0900 EST Double		Ascn C-5 21 Apr 71 0935 EST Single		Ascn C-6 21 Apr 71 1000 EST Double		Ascn C-7 21 Apr 71 1100 EST Combined		Ascn C-8 21 Apr 71 1130 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0		0.0	280.0	1.7	280.0	1.3	030.0	2.6	040.0	2.6	150.0	1.7	Sfc
50	080.4	0.5	261.7	1.9	279.6	2.2	281.3	4.4	290.8	4.4	277.5	4.0	245.9	4.6	249.0	4.5	50
100	281.2	0.2	248.0	2.9	258.4	3.4	274.3	4.9	281.4	4.4	287.6	5.0	244.5	4.6	244.6	4.7	100
150	249.6	1.0	247.0	4.6	258.4	4.7	271.7	5.3	265.2	3.6	287.9	5.3	243.0	4.6	240.5	4.8	150
200	247.7	2.3	250.8	7.0	262.8	5.9	281.9	6.1	243.8	3.3	282.7	4.4	236.9	5.0	238.5	4.4	200
250	250.6	4.1	252.8	7.2	267.7	7.1	268.1	4.2	228.4	3.7	275.1	3.6	231.7	5.5	236.2	4.0	250
300	259.6	6.4	257.6	7.6	271.6	8.2	278.5	5.3	258.4	6.1	260.2	3.7	237.5	5.4	236.0	3.7	300
350	265.1	7.5	263.4	8.7	273.5	8.4	281.9	5.6	267.1	8.4	246.8	4.1	246.1	5.5	241.3	3.7	350
400	271.5	7.8	266.4	7.5	275.7	8.5	282.3	5.6	270.6	9.5	271.2	6.4	262.0	6.7	246.8	3.6	400
450	279.1	9.2	271.5	7.8	279.5	8.4	282.2	5.7	278.4	8.7	249.8	5.4	274.4	7.9	255.8	4.3	450
500	288.5	9.9	276.4	9.6	280.5	8.6	290.5	6.0	284.1	11.2	245.2	5.7	278.4	10.0	262.4	5.1	500
550	294.8	10.5	284.1	10.3	282.2	9.4	294.1	10.2	285.8	11.2			281.0	10.3	266.1	6.2	550
600	298.6	11.1	289.1	10.2	288.1	8.1	294.4	8.8	288.5	9.4			283.9	9.6	272.6	6.8	600
650	302.8	11.6	293.0	10.2	292.2	9.8	291.1	12.2	297.9	10.2			313.3	15.2			650
700	302.3	11.2	294.9	12.7	290.8	11.3	289.2	12.5	303.9	10.7			318.2	17.8			700
750	300.8	11.4	295.7	12.1	289.6	9.3	286.5	8.7	302.4	11.8			301.0	12.6			750
800	299.5	11.5	296.3	9.9	289.3	8.8	286.5	14.3	301.0	12.8			292.6	13.3			800
850	298.8	11.2	295.9	7.7	288.5	10.2			300.9	13.2			290.4	15.0			850
900	298.4	10.6	294.3	11.1	289.3	10.2			298.9	13.5			290.4	15.3			900
950	298.9	10.6	294.0	12.2	292.2	10.2			301.6	13.0			290.2	15.6			950
1000	295.5	11.0	291.4	15.0	295.1	12.5			300.8	14.2			290.0	15.9			1000
1050	293.1	11.1	296.2	8.0	293.6	13.4			297.1	14.3							1050
1100	292.4	11.4	290.8	16.4	293.7	13.4			292.1	14.4							1100
1150	291.5	12.7	290.9	13.6	293.7	14.4			290.4	17.1							1150
1200	290.4	12.5	289.5	13.5	292.8	17.2			287.5	15.9							1200
1250	290.2	13.8	289.0	15.2	293.2	14.8			287.9	20.1							1250
1300	290.2	14.5	290.1	15.5	292.3	16.2			288.3	22.4							1300
1350					291.0	20.7											1350

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-1 22 Apr 71 0800 EST Double		Ascn C-2 22 Apr 71 0830 EST Double		Ascn C-3 22 Apr 71 0850 EST Double		Ascn C-1 23 Apr 71 0730 EST Combined		Ascn C-2 23 Apr 71 0800 EST Double		Ascn C-3 23 Apr 71 0830 EST Combined		Ascn C-4 23 Apr 71 0900 EST Single		Ascn C-5 23 Apr 71 0930 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	270.0	2.6	070.0	5.3	070.0	4.4		0.0	070.0	1.3	020.0	2.2	290.0	1.7	070.0	4.4	Sfc
50	268.1	4.6	266.3	5.8	270.3	5.9	272.9	1.3	265.9	2.4	226.5	2.3	321.2	2.5	262.7	5.5	50
100	279.3	6.9	270.3	6.7	278.3	8.2	264.1	2.0	270.0	2.6	221.8	2.6	301.4	2.3	266.1	6.7	100
150	282.2	8.3	272.9	7.3	274.3	9.4	246.2	2.3	263.2	2.7	238.6	3.0	296.9	1.6	265.6	7.0	150
200	283.9	6.8	273.3	8.1	272.3	7.8	230.5	2.7	257.7	3.4	258.8	3.8	285.4	1.0	263.9	7.4	200
250			271.3	9.1	291.1	7.8	241.8	2.9	270.8	4.0	258.7	4.2	260.7	1.3	264.2	8.2	250
300			271.2	7.9	297.9	8.1	253.4	3.3	285.3	4.4	272.6	5.2	268.1	1.8	270.0	9.6	300
350			273.4	10.8			270.6	4.0	289.2	6.0	280.3	4.0	270.0	2.3	263.0	7.6	350
400			284.7	14.0			282.3	6.2	295.0	6.2	323.7	13.8	270.2	2.7	259.3	5.5	400
450			310.1	18.7			291.4	6.0	308.2	5.5	310.4	12.7	274.0	3.2	274.4	3.2	450
500			317.0	21.5			300.6	6.3	317.3	7.1	298.4	7.7	277.7	4.0	290.9	5.2	500
550							310.2	6.5	330.1	7.7	302.3	5.8	282.8	4.7	304.3	3.7	550
600							318.6	6.7	306.7	5.2	307.0	6.3	287.2	5.2	297.5	6.1	600
650							319.9	7.6	311.1	6.6	310.4	6.4			281.1	7.1	650
700							309.5	7.1	312.8	7.9	315.3	5.8			278.2	8.9	700
750							311.4	7.7	308.5	8.2	314.9	5.5					750
800							310.1	8.2	304.6	8.5	304.8	6.2					800
850							302.8	8.2	303.2	8.3	300.2	7.5					850
900							297.9	8.2	300.7	9.4	293.3	7.5					900
950							295.9	9.9	298.3	11.5	290.6	8.4					950
1000							296.4	11.5	296.0	11.3							1000
1050							302.9	13.2	293.0	10.1							1050
1100							309.6	14.5	294.8	11.6							1100
1150									296.4	13.2							1150

Table 9, (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-6 23 Apr 71 1000 EST Double		Ascn C-7 23 Apr 71 1030 EST Double		Ascn C-8 23 Apr 71 1100 EST Combined		Ascn C-9 23 Apr 71 1130 EST Combined		Ascn C-1 24 Apr 71 0730 EST Double		Ascn C-2 24 Apr 71 0800 EST Single		Ascn C-3 24 Apr 71 0830 EST Combined		Ascn C-4 24 Apr 71 0900 EST Single		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	060.0	5.8	080.0	3.5	090.0	4.9	070.0	4.9		0.0		0.0	290.0	7.5	290.0	6.2	Sfc
50	286.1	6.4	271.0	4.0	273.6	3.7	269.5	7.5	278.4	0.3	254.5	2.7	250.3	8.4	237.9	6.7	50
100	290.0	7.7	275.7	5.1	272.6	5.0	272.6	9.3	241.7	1.5	222.1	3.4	244.8	8.9	240.3	14.8	100
150	290.9	8.5	278.2	5.6	271.9	6.2	277.1	8.9	217.0	5.6	219.7	5.4	239.9	9.5	244.5	23.5	150
200	290.9	8.4	280.0	5.5	270.6	6.3	274.3	9.5	213.9	9.1	223.1	8.2	240.2	11.8	246.5	29.8	200
250	289.5	7.1	277.4	5.6	269.4	6.4	272.0	10.2	213.3	11.6	226.9	12.4	240.6	14.2	246.8	31.2	250
300	287.8	6.1	274.7	5.8	268.6	6.6	270.0	10.9	215.3	13.4	232.9	13.1	240.8	16.6	246.8	20.3	300
350	287.2	6.2	273.6	6.5	267.9	6.9	268.6	12.2	218.5	14.7	237.3	14.2	239.8	18.1	247.1	16.4	350
400	286.5	6.3	272.1	6.9	266.4	7.0	267.6	13.4	224.4	14.0	239.6	15.3	238.7	19.6	248.0	15.4	400
450	286.4	5.9	266.2	5.6	262.5	6.9	266.7	14.7	230.8	14.3	239.6	14.8	237.8	19.9	302.6	0.9	450
500	286.5	5.1	272.6	4.6	258.6	6.9	265.9	15.9	234.3	14.9	240.5	16.3	236.8	18.9	209.2	3.1	500
550	288.8	5.2	267.9	5.4	254.7	6.8	265.3	17.2	236.4	15.6	241.3	18.1	235.2	19.5	229.8	8.1	550
600	290.8	6.8	261.9	6.5	250.7	6.8	263.8	14.6	238.2	16.1	242.5	19.5	237.1	17.5	243.7	12.6	600
650	290.1	8.4	255.8	6.3	252.7	7.1	260.8	10.4	239.8	16.8	246.0	18.8	240.6	15.2	248.9	14.8	650
700	288.0	7.5	254.7	7.1	256.0	7.4	253.5	6.2	242.0	16.9	248.2	15.1	241.2	18.1	248.9	18.0	700
750	287.3	8.0	259.9	9.5	259.0	7.7	221.3	2.4	249.1	14.6	248.8	14.5	241.7	21.0	251.9	22.5	750
800	285.5	8.5	262.5	9.8	261.8	8.1	152.8	1.9	247.9	18.1	248.2	16.3	242.6	20.9	253.5	25.1	800
850	284.1	8.9	264.8	8.0	264.3	8.5	251.0	2.3	245.4	23.3	247.7	18.7	243.6	20.7	253.4	25.9	850
900	284.5	9.2	271.8	6.8	265.5	8.7	272.0	5.3	245.2	26.2	248.2	18.3	244.9	19.2	252.3	28.0	900
950	288.6	9.4	278.0	5.2	266.0	8.8	276.6	7.3	245.0	29.1	245.5	19.2	246.7	16.9	255.7	27.6	950
1000	299.4	8.9	279.3	7.3	266.5	8.8	278.1	7.5	245.7	28.2	245.0	22.0	261.8	16.9	255.1	23.5	1000
1050	299.2	15.7	281.2	6.3	267.0	8.9	279.4	7.6	252.5	15.5	244.8	23.1	280.0	20.0	256.8	21.4	1050
1100	303.9	8.6	288.1	4.1	270.6	8.6	280.3	7.9	257.6	12.7	244.7	23.1	270.3	22.0	260.3	19.8	1100
1150	301.6	8.8			275.7	8.3	280.1	8.7	251.8	21.4	244.9	24.3	255.3	24.9	260.1	12.6	1150
1200					276.0	9.0	279.8	9.4	252.0	23.9	246.5	22.6	250.9	27.6	260.9	12.4	1200
1250					273.0	10.7	280.0	10.0	254.7	21.2			249.7	30.0	258.1	12.0	1250
1300					270.9	12.3	284.4	9.1	258.8	16.5			248.2	29.1	256.4	11.8	1300
1350					270.1	13.3	289.6	8.3					246.3	26.9			1350
1400					269.4	14.2	291.8	8.0					246.7	26.7			1400
1450					268.8	15.2	283.6	9.4					248.2	27.5			1450
1500					268.6	15.7	277.6	10.9					249.3	30.6			1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-5 24 Apr 71 0930 EST Double		Ascn C-1 26 Apr 71 0630 EST Single		Ascn C-2 26 Apr 71 0700 EST Double		Ascn C-3 26 Apr 71 0800 EST Double		Ascn C-4 26 Apr 71 0830 EST Double		Ascn C-5 26 Apr 71 0930 EST Double		Ascn C-6 26 Apr 71 1000 EST Double		Ascn C-7 26 Apr 71 1030 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	290.0	6.2		0.0	250.0	0.8	240.0	3.1	250.0	4.0	230.0	2.6	220.0	3.5	230.0	3.5	Sfc
50	261.9	8.0	329.6	2.6	265.9	5.6	287.9	4.4	278.5	6.3	277.4	6.2	276.5	5.6	279.1	5.4	50
100	246.4	9.2	247.7	3.8	276.0	6.0	299.8	5.3	274.0	7.9	279.9	6.9	287.1	6.5	281.0	6.5	100
150	242.9	9.8	224.1	4.2	278.7	6.5			275.3	9.0	281.4	8.5	294.4	7.1	278.7	6.7	150
200	239.8	10.5	230.4	3.3	267.1	7.3			281.3	8.5	286.5	8.6	300.6	7.6	273.4	6.3	200
250	238.1	11.3	225.2	2.3	261.7	7.3			286.3	8.9	280.4	6.8	301.8	7.7	274.9	7.3	250
300	240.5	12.2	265.3	5.4	261.9	6.1			283.0	9.6	279.0	7.7			275.4	8.5	300
350	242.6	13.1	276.1	7.3	260.8	6.2			279.4	9.8	279.6	8.6			271.6	9.2	350
400	244.4	14.0	284.0	7.8	260.8	6.7			274.6	9.3	283.2	9.4			282.4	9.6	400
450	245.8	14.3	286.1	9.2	272.3	8.9			273.6	9.5	286.1	10.3			288.7	9.8	450
500	246.9	13.9	282.9	9.4	279.1	11.3			275.4	10.1	285.8	9.9			290.6	9.9	500
550	248.2	13.5	280.6	8.8	280.9	11.1			275.4	9.7	281.6	8.4			289.3	9.9	550
600	249.5	13.2	279.7	8.5	282.0	10.2			274.2	8.6	275.6	7.0			285.8	11.3	600
650	250.7	13.7	278.9	10.2	281.7	10.0			275.8	9.1	270.9	6.4			282.5	13.1	650
700	251.8	14.1	279.4	12.0	280.3	10.4			277.5	9.9	273.7	7.7			281.4	13.0	700
750	252.9	14.6	279.2	14.3	278.3	11.3			279.1	11.6	275.7	9.0			281.0	11.8	750
800	254.5	14.8	280.3	15.4	276.3	12.5			280.3	13.3	276.6	9.6			281.6	11.5	800
850	257.5	14.2	282.2	15.8	274.9	12.9			283.2	13.3					283.3	12.4	850
900	260.7	13.7	282.2	17.0	273.9	12.9			287.1	12.7					284.9	14.5	900
950	264.1	13.3			274.3	13.0			290.5	12.3					286.2	17.6	950
1000	266.8	12.9			275.6	13.2									287.2	20.8	1000
1050	265.3	12.8			276.7	8.4									288.3	17.9	1050
1100	263.8	12.6													290.0	14.9	1100
1150	262.2	12.5													290.7	13.9	1150
1200	261.4	12.2															1200
1250	262.6	11.5															1250
1300	263.9	10.8															1300
1350	265.5	10.1															1350
1400	261.2	12.6															1400
1450	258.3	15.0															1450
1500	256.2	17.6															1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-1 28 Apr 71 0630 EST Double		Ascn C-2 28 Apr 71 0700 EST Double		Ascn C-3 28 Apr 71 0800 EST Double		Ascn C-1 29 Apr 71 0630 EST Single		Ascn C-2 29 Apr 71 0730 EST Single		Ascn C-3 29 Apr 71 0800 EST Double		Ascn C-4 29 Apr 71 0830 EST Double		Ascn C-5 29 Apr 71 0900 EST Single		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0	320.0	5.3	320.0	2.6	260.0	5.3	030.0	7.1	060.0	6.7	070.0	7.1	060.0	5.8	Sfc
50	086.6	1.0	189.1	3.0	194.2	3.7	254.7	6.5	277.7	7.1	286.3	7.6	278.2	7.8	280.4	3.8	50
100	146.0	1.9	184.1	4.3	180.8	4.0	259.6	10.4	285.3	11.8	254.9	7.6	274.4	9.8	268.6	6.6	100
150	160.6	3.5	183.1	5.4	180.0	3.1	260.6	10.4	282.0	13.9	257.1	7.2	280.9	11.8	268.8	7.4	150
200	160.8	3.6	184.7	6.4	191.1	1.8	260.7	10.6	276.2	14.7	259.3	7.4	279.9	11.7	269.7	7.5	200
250			187.5	7.1	192.9	2.5	259.8	13.2	268.1	14.7	260.6	8.9	276.6	11.4	269.1	7.4	250
300			189.4	7.2	193.6	2.9	261.2	13.2	269.8	20.4	261.6	10.4	274.7	15.5	270.5	7.9	300
350			191.5	7.4			261.3	13.0	271.8	24.2	262.5	11.7	274.9	14.9	270.7	9.7	350
400			193.6	8.1			261.5	12.4	274.2	28.2	267.5	11.2	276.0	8.5	270.3	12.5	400
450			190.6	9.3			268.3	10.6	275.9	40.4	273.0	10.7			270.4	14.6	450
500			192.4	10.0			272.1	11.8	274.5	36.9	284.9	9.5			271.6	14.8	500
550			197.1	9.3			271.4	13.5	272.6	26.8	279.7	14.7			273.5	13.0	550
600			197.4	10.6			270.2	14.7	270.4	12.5	278.6	16.1			275.9	10.8	600
650			202.0	9.7			274.1	14.9	086.6	4.6	278.0	17.0			275.8	11.7	650
700							275.5	12.7	275.1	12.2	277.9	18.6			275.9	11.5	700
750									276.4	20.7	278.3	17.7					750
800									277.3	23.3	279.4	16.9					800
850											280.1	16.5					850

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-1 4 May 71 0630 EST Single		Ascn C-2 4 May 71 0700 EST Double		Ascn C-3 4 May 71 0730 EST Double		Ascn C-4 4 May 71 0800 EST Combined		Ascn C-5 4 May 71 0830 EST Double		Ascn C-6 4 May 71 0900 EST Combined		Ascn C-7 4 May 71 0930 EST Combined		Ascn C-8 4 May 71 1000 EST Combined		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0	230.0	2.2	230.0	0.8	220.0	5.3	200.0	2.6	270.0	3.5	240.0	2.6	Sfc
50	262.3	4.8	262.3	4.9	277.1	5.2	270.9	3.7	252.8	5.3	226.6	3.0	288.4	7.6	304.3	6.7	50
100	263.6	5.7	266.3	5.7	270.2	6.6	269.8	3.5	255.9	5.5	244.0	3.6	285.0	8.2	292.7	7.1	100
150	265.6	5.9	269.1	7.5	270.3	6.0	267.9	3.5	257.3	5.9	252.4	4.4	271.5	8.7	281.8	7.6	150
200	266.1	5.4	271.8	9.0	273.3	5.0	264.5	4.0	258.4	6.4	258.2	5.3	264.1	9.1	274.2	8.4	200
250	262.0	3.7	277.7	8.4	272.5	6.7	262.2	4.4	267.6	7.1	259.2	5.9	258.6	9.6	270.7	9.1	250
300			276.7	8.9	272.4	7.8	266.8	5.2	275.3	6.8	259.2	6.5	260.8	8.8	267.7	9.8	300
350			278.4	8.4	272.6	8.5	270.2	6.1	283.5	5.9	259.7	6.8	264.5	7.9	267.4	10.1	350
400			279.1	7.3	277.2	9.5	275.8	7.0	283.3	7.3	261.0	6.6	275.8	7.3	269.9	9.7	400
450			286.8	7.8	281.7	10.2	284.9	8.2	280.8	7.1	262.2	6.8	287.1	7.1	272.7	9.4	450
500			300.7	8.7	288.4	9.7	291.8	9.5	270.4	7.3	262.7	7.7	289.2	7.6	274.8	9.5	500
550			303.7	11.8	296.0	10.9	308.6	8.8	284.4	9.3	276.9	9.5	291.1	8.0	276.8	9.7	550
600			308.5	12.1	301.3	13.1	311.2	10.8	292.8	10.1	286.9	9.8	293.2	9.2	279.9	9.1	600
650			318.3	9.4			311.4	13.0	304.0	10.5	290.2	13.5	294.9	10.6	284.3	8.2	650
700			324.3	9.4			314.1	14.4	314.5	10.8	293.1	12.1	290.9	12.3	291.1	7.5	700
750			318.2	12.1			314.8	14.8			317.5	6.7	285.9	14.1	300.7	7.3	750
800			315.3	13.9			312.8	13.7			310.5	11.0	287.8	12.1	305.5	8.6	800
850							313.2	15.3			296.4	22.4	294.0	10.6	309.7	7.9	850
900							315.4	19.9			298.5	19.4	294.6	12.8	303.9	9.5	900
950							316.4	21.1			301.5	16.4	291.6	16.6	304.0	10.6	950
1000							317.1	19.1			306.6	16.0	293.9	14.2	301.5	16.7	1000
1050							317.5	18.3			311.9	16.8	301.0	9.8	300.9	18.7	1050
1100											311.9	16.4	302.2	11.6	300.9	17.5	1100
1150											312.2	16.2	301.8	15.2	303.5	16.2	1150
1200											313.1	16.3	307.5	15.3	306.5	14.4	1200
1250											312.1	17.6	310.6	16.8	309.9	11.5	1250
1300											310.4	19.5	311.0	19.5	307.8	8.9	1300
1350											311.0	20.7	311.2	21.0	299.1	6.5	1350
1400											311.0	22.3	311.6	22.2	289.3	3.5	1400
1450											310.0	24.6	314.2	24.9	284.0	3.1	1450
1500											310.1	26.7	313.9	27.0	295.4	6.3	1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-9 4 May 71 1030 EST Double		Ascn C-1 5 May 71 0630 EST Combined		Ascn C-2 5 May 71 0700 EST Single		Ascn C-3 5 May 71 0730 EST Double		Ascn C-4 5 May 71 0800 EST Combined		Ascn C-5 5 May 71 0830 EST Double		Ascn C-6 5 May 71 0900 EST Double		Ascn C-7 5 May 71 0930 EST Combined		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	270.0	5.3		0.0		0.0		0.0	270.0	2.6	180.0	2.6	225.0	6.7	225.0	6.7	Sfc
50	300.3	9.0	249.7	2.7	238.8	1.7	227.6	0.3	225.0	3.2	200.4	3.6	234.8	7.4	251.3	6.3	50
100	302.2	10.0	235.3	4.7	233.6	4.8	241.1	2.3	230.3	3.7	213.6	4.4	238.2	8.1	250.5	6.7	100
150	300.3	10.6	227.6	6.0	221.1	5.4	229.8	3.8	229.8	4.4	214.8	5.1	241.3	8.7	250.9	7.1	150
200	295.3	10.8	225.3	7.2	213.1	6.5	223.0	5.1	225.0	5.3	215.7	5.8	244.5	8.8	252.7	7.5	200
250	290.5	11.2	223.5	8.4	215.8	8.9	218.5	6.3	214.7	6.9	216.8	6.3	247.3	8.9	254.3	7.8	250
300	288.4	11.5	220.9	9.5	219.3	8.9	216.3	7.4	211.2	8.4	219.1	6.3	249.4	8.5	255.5	7.9	300
350	288.4	11.8	220.8	9.1	222.8	9.8	213.8	9.2	216.0	9.6	221.5	6.3	251.6	8.1	256.7	8.0	350
400	288.3	12.1	223.8	11.2	226.1	11.3	214.1	10.7	220.0	10.7	222.7	7.4	252.3	7.8	258.0	8.1	400
450	288.3	12.4	201.9	17.6	231.4	11.8	217.0	11.6	226.6	10.3	223.3	8.9	345.8	0.6	259.4	8.1	450
500	286.6	11.9	216.1	14.7	233.3	11.9	218.1	9.9	231.8	11.4	234.1	8.7	250.2	4.5	260.8	8.2	500
550	284.4	11.3	234.5	12.3	233.9	12.1	227.9	10.5	234.9	13.4	242.6	9.5	249.3	5.3	259.4	8.0	550
600	281.8	10.6	237.8	11.8	234.6	12.5	232.3	12.8	238.6	14.2	242.6	12.4	228.3	5.3	253.2	7.5	600
650	279.0	10.0	241.5	12.4	237.4	12.3	234.8	14.0	244.7	13.4	243.1	13.4	202.1	10.8	246.2	7.1	650
700	276.6	9.6	244.6	12.1	240.0	12.6	239.9	12.6	249.1	12.8	244.5	11.9	250.7	9.5	244.2	6.9	700
750	274.4	9.3	245.5	12.3	243.3	13.0	244.1	13.5	251.4	14.2					246.0	6.7	750
800	272.0	9.0	245.5	12.6	246.4	13.2	246.9	14.2	247.3	18.7					251.5	6.8	800
850	269.5	8.7	246.4	12.9	250.0	13.0	256.8	11.1	230.7	21.9					255.3	6.6	850
900	266.8	8.4	249.1	13.4	256.8	12.2	259.4	12.3	230.1	23.1					247.3	6.7	900
950	271.0	8.8	252.0	13.9	256.9	13.5	262.0	13.2	252.8	21.1					219.5	12.4	950
1000	275.3	9.4	254.2	14.4	259.9	14.4	263.4	15.1	254.3	22.7					219.7	14.3	1000
1050	279.0	10.1	257.5	15.0	262.8	14.4			257.7	21.2					244.2	10.9	1050
1100	282.2	10.7	261.5	15.8	266.1	13.7			263.8	18.2					266.4	9.9	1100
1150	280.4	8.4	265.2	16.5	271.6	13.3			262.8	18.4					268.0	8.7	1150
1200	279.7	7.2	267.5	17.2	272.4	15.0			263.8	18.9					270.1	8.4	1200
1250	285.3	10.7			276.7	14.6			266.8	18.3					271.7	9.9	1250
1300	287.6	12.1			279.0	14.3			273.8	15.5					272.2	11.2	1300
1350	288.8	9.9							274.4	15.1					270.8	11.6	1350
1400	288.7	12.2							274.3	15.1					269.7	11.9	1400
1450	289.5	14.9													270.0	12.2	1450
1500	293.4	14.3													270.2	12.7	1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-8 5 May 71 1000 EST Double		Ascn C-1 7 May 71 0900 EST Double		Ascn C-2 7 May 71 0930 EST Double		Ascn C-3 7 May 71 1000 EST Double		Ascn C-4 7 May 71 1030 EST Double		Ascn C-5 7 May 71 1100 EST Double		Ascn C-1 10 May 71 0630 EST Combined		Ascn C-2 10 May 71 0700 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	225.0	7.1		0.0	360.0	2.2	045.0	4.9	112.0	3.5	135.0	3.1		0.0	090.0	0.8	Sfc
50	235.0	8.0	203.1	0.5	063.5	2.7	098.6	3.0	125.7	5.7	145.3	5.8	331.1	0.4	099.7	0.8	50
100	239.2	8.5	037.4	1.8	055.1	3.3	112.3	2.6	129.1	6.1	139.2	5.7	299.7	0.9	325.9	0.6	100
150	241.8	9.0	054.0	3.3	056.3	3.8	098.1	2.8	124.8	5.7	132.3	5.6	208.6	0.9	285.0	1.1	150
200	244.4	8.7	070.8	4.3	076.5	4.1	084.7	2.6	128.4	5.1	128.2	5.3	199.5	0.9	281.7	1.3	200
250	247.3	8.1	083.8	4.3	087.1	4.5	082.9	3.9	130.6	5.1	127.2	4.8	174.3	0.5	310.0	0.7	250
300	259.5	7.2	094.6	4.7	091.2	4.8	083.8	4.3	125.2	6.0	126.0	4.3	127.1	1.5	092.5	0.7	300
350	262.3	7.5	105.3	4.8	103.4	4.8	088.9	4.0	119.8	6.8	134.2	4.3	068.4	2.4	071.0	2.0	350
400	253.5	7.7	108.6	4.8	109.8	4.4	109.1	3.8	129.5	4.1	140.0	4.1	060.3	4.9	066.0	4.4	400
450	231.9	3.5	107.1	4.9	110.5	4.5	119.6	3.3	155.6	2.1	127.7	2.8	054.0	6.7	052.0	6.4	450
500	243.9	6.8	107.4	5.0	108.9	4.8	138.4	3.7	152.3	1.8	118.8	2.6	043.6	7.3	048.3	7.0	500
550	246.3	7.2	113.6	4.6	107.2	4.9	127.4	2.9	141.4	1.9	120.5	3.2	045.0	6.9	047.6	7.0	550
600	244.3	8.2	120.2	4.0	108.7	4.7	137.7	3.9	130.6	2.1	124.5	3.2	047.4	7.4	046.8	7.1	600
650	243.3	7.7	124.5	3.2	111.2	4.3	131.4	7.0	126.5	3.1	127.1	2.9	052.0	8.3	045.9	7.4	650
700	244.3	7.3	119.5	3.1	111.2	3.6	136.9	5.6	124.6	3.9	113.8	2.0	054.1	9.0	045.4	7.5	700
750	246.0	8.0	117.7	2.5	111.8	3.3	141.4	4.6			102.1	2.1	053.5	9.8	038.0	7.8	750
800	255.8	5.9	121.8	1.9	113.2	3.3	137.8	4.4			097.4	2.4	051.2	8.9	038.4	8.6	800
850	251.8	7.7	134.1	1.9	115.7	3.6	134.6	4.6			102.9	2.5	048.2	8.7	038.7	8.7	850
900	246.8	10.1	135.7	2.3	121.5	3.3	132.3	4.9			106.6	2.4	039.5	7.0	039.7	10.2	900
950			132.3	3.4	125.1	3.2	134.9	4.2			108.6	1.7	121.1	6.9	039.3	10.5	950
1000			135.6	2.8	121.3	3.1	139.9	3.4			114.2	1.4	037.2	8.0	037.3	8.9	1000
1050			146.2	2.1	123.0	3.2	136.5	3.9			119.0	2.2	028.5	9.5			1050
1100			151.3	1.9	127.4	3.3	137.9	4.2			118.1	2.7	032.4	9.4			1100
1150			139.9	2.2	133.9	3.0	138.0	3.5			113.3	2.7	035.1	9.6			1150
1200			163.0	1.0	130.3	3.3	136.6	2.9			111.2	2.4					1200
1250			155.8	1.1	124.7	3.4	135.4	3.8			109.8	1.8					1250
1300					117.1	3.2					097.2	0.9					1300
1350					110.3	2.2					109.6	1.2					1350
1400					095.8	1.2					121.2	2.1					1400
1450											122.4	2.3					1450

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-3 10 May 71 0730 EST Double		Ascn C-4 10 May 71 0800 EST Combined		Ascn C-5 10 May 71 0830 EST Double		Ascn C-6 10 May 71 0900 EST Combined		Ascn C-7 10 May 71 0930 EST Double		Ascn C-8 10 May 71 1000 EST Double		Ascn C-9 10 May 71 1030 EST Double		Ascn C-10 10 May 71 1100 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0	202.0	0.8	157.0	1.3	225.0	1.3		0.0		0.0	315.0	3.5	Sfc
50	181.4	0.8	202.6	0.6	232.7	1.5	238.8	0.4	222.7	1.3	114.2	1.3	324.5	0.3	349.1	4.4	50
100	218.5	1.0	211.2	1.1	268.0	0.7	323.3	0.8	173.2	1.3	095.3	1.3	342.5	0.3	353.9	3.6	100
150	240.9	1.4	232.2	0.7	335.8	0.7	008.7	1.4	148.0	1.7	074.3	1.3	355.6	0.4	006.5	3.7	150
200	261.8	1.3	272.6	0.3	010.8	1.0	012.4	1.9	137.0	1.9	097.3	1.5	008.8	0.4	012.0	4.4	200
250	296.3	0.8	056.2	0.2	046.8	1.5	019.2	2.5	148.2	2.0	126.4	1.5	062.4	0.2	006.4	3.7	250
300	044.7	0.6	076.8	0.8	054.0	2.1	031.3	3.1	155.2	1.7	164.2	1.0	111.9	0.4	009.0	3.3	300
350	087.8	1.7	069.6	2.4	046.7	2.5	048.0	3.6	155.0	0.9	152.5	1.2	127.9	0.7	003.8	3.4	350
400	072.4	3.0	055.1	4.0	040.1	3.0	049.6	3.9	019.5	0.7	189.9	0.9	132.1	0.8			400
450	048.3	5.0	045.8	5.4	050.3	3.7	042.9	4.4	024.7	0.7	211.1	1.4	128.4	0.3			450
500	047.4	6.2	044.2	6.4	049.0	4.5	037.1	4.9	020.8	1.7	210.3	1.1	343.2	0.0			500
550	046.2	6.5	046.0	7.0	052.8	5.6	035.1	5.4	023.6	2.8	221.9	0.8	323.0	0.5			550
600	045.4	6.9	046.2	7.7	053.3	6.5	036.3	5.9	035.1	3.2	262.9	0.5	337.8	0.9			600
650	046.0	7.7	045.2	8.0	049.2	7.1	039.4	6.7	036.8	3.7	347.0	0.9	343.3	1.3			650
700	041.7	5.7	044.9	7.7	045.8	7.7	042.4	7.0	034.9	4.1	009.9	2.0	357.6	1.3			700
750	041.0	7.3	044.8	7.1	043.6	8.3	040.3	8.8	032.9	5.2	013.7	2.7	009.1	1.5			750
800	040.0	7.0	044.5	7.2	040.0	8.4	039.5	9.3	033.2	6.2			000.7	4.2			800
850	038.5	7.4	046.1	7.9	040.6	8.6	039.9	8.0	031.2	6.1			340.0	3.6			850
900	037.1	7.4	046.0	8.7	042.0	9.4	040.6	8.3	029.7	6.6			343.5	4.4			900
950	036.8	7.3	044.7	9.3	043.0	9.8	040.7	8.7	031.5	7.0			345.0	4.8			950
1000	039.2	9.5	043.1	9.6	043.4	9.0	039.6	8.6	033.6	6.9			345.0	4.5			1000
1050	040.6	12.7	041.2	10.3	044.2	9.6	036.2	8.2					347.2	4.3			1050
1100	038.2	11.7	038.6	10.0	044.8	10.0	031.5	8.7					356.7	3.8			1100
1150	031.4	8.6	037.2	9.6	045.3	9.9	022.8	7.6					007.3	3.6			1150
1200	029.1	8.4	038.3	9.8	043.9	10.5							010.2	3.8			1200
1250			037.4	9.9	042.8	9.8							012.7	4.1			1250
1300					042.1	9.1							003.0	5.0			1300
1350													355.6	6.1			1350
1400													356.4	7.0			1400
1450													359.3	7.8			1450
1500													360.0	8.2			1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-1 11 May 71 0630 EST Double		Ascn C-2 11 May 71 0700 EST Double		Ascn C-3 11 May 71 0730 EST Double		Ascn C-4 11 May 71 0800 EST Double		Ascn C-5 11 May 71 0830 EST Double		Ascn C-6 11 May 71 0900 EST Double		Ascn C-7 11 May 71 0930 EST Double		Ascn C-8 11 May 71 1000 EST Single		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0	157.0	0.8		0.0	090.0	1.3	180.0	0.8		0.0	157.0	6.7	Sfc
50	147.5	0.3	235.4	0.8	234.9	0.2	308.3	0.2	227.5	0.1	216.3	1.0	199.7	3.0	174.2	16.4	50
100	021.6	1.4	283.8	0.8	340.7	1.0	359.4	0.9	041.1	1.0	259.2	0.6	191.6	2.6	159.8	4.1	100
150	021.3	1.8	354.0	1.5	333.8	0.9	069.7	0.4	077.9	1.1	130.1	0.4	186.5	2.8	073.6	1.6	150
200	064.8	0.9	042.5	0.9	339.2	0.1	135.9	2.0	119.8	1.7	127.7	1.3	188.0	4.5	049.4	1.9	200
250	143.5	2.0	137.2	2.1	134.6	3.3	140.6	4.7	128.1	2.9	137.4	1.9	172.3	5.8	119.8	1.0	250
300	145.4	3.5	142.5	4.5	135.2	6.7	133.2	4.8	131.9	4.1	133.2	2.3	177.9	6.5	174.4	0.8	300
350	145.0	5.2	145.1	6.3	139.2	7.5	144.3	4.6	134.8	5.2	133.5	2.5	173.8	5.6	177.4	1.7	350
400	142.0	7.9	146.1	7.7	143.2	8.0	148.0	5.2	136.6	6.2	152.5	2.4	167.4	5.3	165.6	3.1	400
450	143.8	7.8	148.1	8.6	149.2	7.5	151.6	6.2	143.7	5.5	169.3	2.7	163.6	6.0	158.2	4.4	450
500	149.3	6.1	153.9	8.5	152.9	8.9	156.4	7.5	153.0	4.8	163.8	5.1	167.8	7.7	161.2	5.0	500
550	155.5	5.4	157.1	8.4	157.2	8.2	157.8	8.7	157.1	5.4	161.0	6.9	170.3	9.3	165.0	5.4	550
600	156.3	6.0	160.5	7.8	163.4	6.6	162.3	8.2	157.1	6.8	158.3	6.8	165.4	8.9	167.4	5.7	600
650	158.5	4.8	169.3	4.6	166.5	6.1	166.3	7.6	157.6	7.6	158.8	7.2	164.7	9.1	167.0	5.6	650
700	162.7	4.0	170.3	5.7	171.4	5.8	169.4	6.8	158.4	8.0	157.2	7.6	164.0	8.0	164.6	6.4	700
750	168.9	3.8	174.1	5.3	174.0	5.7	173.0	5.7	159.1	8.4	163.8	8.1	162.7	6.3	163.9	6.5	750
800	175.9	3.9	178.9	4.8	175.0	5.9	175.0	5.3	160.0	8.3	163.4	9.7	166.9	9.9	167.3	6.7	800
850			176.0	6.3	175.0	6.4	174.7	5.1	162.2	8.3	164.1	8.8	168.8	13.6	171.8	7.2	850
900			182.7	5.2	174.1	6.8	174.9	4.5	167.3	7.9	165.9	7.2	169.2	12.2	171.7	7.1	900
950			182.0	5.9	175.5	6.0	172.3	5.3	172.8	8.3	163.3	10.4	169.5	10.5	177.5	6.3	950
1000			176.8	8.1	183.9	3.8	167.4	9.4	172.0	11.2	164.2	10.8	170.1	9.4	181.6	7.1	1000
1050			180.6	6.2			167.6	9.1	171.8	13.7	164.9	11.2	171.2	10.0	184.5	7.5	1050
1100			183.3	5.3			170.8	6.0	178.8	9.8	165.0	12.3	172.1	10.6	187.1	7.1	1100
1150			177.9	7.4			169.6	7.0	189.1	7.1	165.2	13.3	173.5	12.2	188.5	6.4	1150
1200			178.1	7.2			168.1	8.7	179.9	9.7	166.8	9.9	174.7	14.0	188.5	5.6	1200
1250			180.8	6.0			168.1	9.1	176.3	11.6	168.9	8.1	175.6	15.8	189.7	5.5	1250
1300			187.6	4.6			168.0	9.8	176.7	12.0	168.3	10.8	176.4	14.9	190.2	5.5	1300
1350			186.5	5.1			167.4	11.6	177.0	12.4	172.5	7.9	177.5	11.8			1350
1400			178.7	8.1			167.0	13.3	177.3	12.7	176.9	8.0	179.3	8.7			1400
1450			177.2	9.2			167.0	13.4	177.3	12.7	175.3	13.1	178.1	8.5			1450
1500											175.3	13.1	176.2	9.2			1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-9 11 May 71 1030 EST Double		Ascn C-1 14 May 71 0630 EST Double		Ascn C-2 14 May 71 0700 EST Combined		Ascn C-3 14 May 71 0730 EST Combined		Ascn C-4 14 May 71 0800 EST Combined		Ascn C-5 14 May 71 0830 EST Double		Ascn C-6 14 May 71 0900 EST Combined		Ascn C-7 14 May 71 0930 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	112.0	5.3	247.0	0.8	202.0	1.7	202.0	4.4	202.0	5.3	202.0	3.5	225.0	4.4	247.0	3.5	Sfc
50	125.6	5.7	249.1	2.6	255.0	2.4	237.4	3.2	206.5	5.2	218.2	2.4	260.2	4.8	250.5	3.9	50
100	129.0	5.6	227.7	4.0	234.3	3.1	226.3	3.2	222.2	4.0	222.8	2.9	260.8	5.4	264.6	4.0	100
150	131.8	5.4	220.8	5.3	221.5	4.1	221.3	3.4	225.2	3.7	223.4	3.9	259.9	6.5	276.9	4.5	150
200	136.8	5.5	219.0	6.3	213.0	5.3	228.8	4.0	222.9	4.2	226.9	4.1	258.6	7.0	268.6	5.4	200
250	141.9	5.7	215.1	7.5	223.7	6.1	229.9	5.3	222.9	4.7	231.2	4.0	257.5	6.8	262.3	6.4	250
300	149.9	5.2	220.2	8.2	234.0	7.0	232.2	6.4	228.2	5.0	234.9	3.5	255.3	7.1	257.5	6.6	300
350	160.2	4.7	242.8	8.4	241.7	7.9	240.7	6.8	238.8	5.9	241.1	3.4	253.0	6.9	252.9	6.8	350
400	161.2	5.3	256.7	8.5	247.9	8.7	249.6	8.0	248.3	5.6	248.1	3.7	251.6	6.0	247.0	6.2	400
450	158.8	6.3	258.6	9.4	254.2	8.9	255.7	9.9	250.4	7.2	253.7	4.1	248.1	6.7	240.1	5.7	450
500	157.0	7.3	260.1	10.5	254.4	8.6	258.4	12.5	253.0	8.5	258.2	4.4	242.8	6.8	238.0	5.6	500
550	159.0	7.4	264.2	11.6	224.4	14.4	274.2	8.9	262.7	8.2	259.9	5.7	244.8	6.7	237.1	5.5	550
600	161.9	7.3	264.8	11.8	255.1	13.4	278.5	13.5	265.0	8.9	260.6	7.1	249.7	5.5	243.1	6.2	600
650	164.8	7.2			280.0	14.6	285.2	14.1	245.9	9.6	261.0	7.6	254.6	6.1	246.6	6.1	650
700	176.6	6.5			290.1	14.7	268.4	11.1	254.3	9.7	261.9	8.5	258.9	7.2	248.2	4.8	700
750	188.6	6.4			294.5	14.4	247.2	9.4	297.0	13.0	263.4	9.8	268.9	6.7	252.0	5.8	750
800	171.7	11.1			296.7	14.3	293.7	11.4	295.5	13.6	276.3	8.1	228.6	5.3	262.6	6.8	800
850	170.3	8.8					302.0	12.1	296.5	13.0	287.8	9.7	215.9	4.6	272.6	8.1	850
900	170.3	9.1					302.0	12.1	298.2	12.5	286.0	13.3	309.9	8.5	280.8	9.4	900
950	170.7	9.4					298.8	12.7	301.4	12.9			305.5	9.7	287.0	10.7	950
1000	169.1	9.8					303.5	13.5	303.2	12.1			301.6	10.3	292.2	11.8	1000
1050	165.4	12.0					305.5	13.9	303.6	11.2					292.4	13.3	1050
1100	168.4	6.2													291.0	14.7	1100
1150	170.0	7.5															1150
1200	169.0	13.1															1200
1250	169.4	14.8															1250
1300	172.0	10.6															1300
1350	178.2	6.4															1350
1400	192.9	2.5															1400
1450	190.4	4.2															1450
1500	183.7	6.7															1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-8 14 May 71 1000 EST Double		Ascn C-9 14 May 71 1030 EST Double		Ascn C-10 14 May 71 1100 EST Double		Ascn C-1 15 May 71 0630 EST Double		Ascn C-2 15 May 71 0700 EST Double		Ascn C-3 15 May 71 0730 EST Double		Ascn C-4 15 May 71 0800 EST Double		Ascn C-5 15 May 71 0830 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	270.0	5.3	247.0	4.4	292.0	3.5		0.0		0.0		0.0	270.0	0.8	270.0	0.8	Sfc
50	248.5	4.2	239.9	2.7	292.4	3.7	271.2	0.8	093.8	0.5	026.6	0.6	052.4	0.5	287.4	0.2	50
100	245.6	4.0	248.9	3.1	293.2	3.6	237.2	0.5	077.1	0.3	086.3	0.5	080.3	0.8	029.0	0.3	100
150	250.6	4.2	256.5	4.2	294.1	3.4	220.7	1.4	350.4	0.6	105.9	0.3	053.9	0.7	076.5	0.3	150
200	250.9	4.4	259.7	5.1	292.0	3.5	201.3	3.2	335.1	0.4	177.9	0.7	074.7	0.5	171.1	1.5	200
250	247.3	4.5	258.2	5.4	287.3	4.0	193.9	5.6	235.4	0.5	187.5	2.2	128.2	0.6	180.2	4.8	250
300	241.8	4.8	256.8	5.7	280.5	4.5	189.2	5.3	217.5	1.7	183.7	3.9	183.7	2.0	173.8	6.3	300
350	247.4	4.8	259.4	5.8	272.0	5.3	182.9	4.6	200.5	2.8	181.2	5.8	191.2	3.8	168.0	7.5	350
400	254.5	4.8	263.8	5.8	267.5	6.2	180.1	5.7	189.9	4.2	180.1	6.4	188.2	4.8	167.6	7.1	400
450	252.4	5.1	268.2	5.9	265.3	7.1	179.1	7.4	189.9	4.9	179.3	6.6	186.2	5.9	168.0	6.5	450
500	250.8	5.5	269.8	6.0	261.3	7.5	181.9	8.2	191.8	5.4	181.0	6.6	187.5	6.4	175.0	6.5	500
550	249.9	5.7	268.4	6.1	255.8	7.7	186.7	8.6	197.2	5.6	189.5	6.5	190.1	6.8	183.6	6.9	550
600	250.0	6.8	267.0	6.2	260.9	8.4	196.7	8.1	204.9	5.7	197.9	6.6	192.3	7.1	188.1	7.9	600
650	251.7	7.8	266.3	6.3	267.1	9.2	203.6	7.8	212.4	5.6	206.6	6.2	197.5	7.1	194.9	8.0	650
700	267.7	5.7	267.8	6.1	271.7	9.7	209.0	6.9	218.5	5.6	214.2	6.0	204.2	6.9	209.0	7.0	700
750	272.4	6.0	269.5	5.8	275.7	9.8	215.4	5.6	219.4	5.6	215.6	6.2	211.1	6.8	210.9	7.5	750
800	271.6	6.9	274.5	7.7	279.7	9.8	216.8	6.2	221.2	5.2	216.4	6.6	211.8	6.7	211.5	7.9	800
850	279.9	7.4	278.3	9.9	291.7	8.2	214.0	7.4	222.6	5.4	216.8	7.0	212.6	6.6	221.0	6.0	850
900	285.8	7.8	285.5	11.8	294.0	5.8	221.5	5.6	223.0	6.2	216.6	7.1	212.9	6.5	222.8	5.7	900
950			287.7	13.6	287.0	10.3	222.0	6.3	228.6	5.8	217.2	7.0	213.3	6.3	213.1	7.3	950
1000			286.2	15.0	283.8	16.0	219.6	8.1	237.4	4.7	219.7	6.5	213.2	6.4	215.6	7.2	1000
1050			284.4	15.6	284.1	16.3	238.5	4.7	237.9	4.0	226.6	5.3	213.5	6.2	217.9	7.1	1050
1100			284.5	14.8	284.3	16.6	235.6	5.9	233.3	5.0	225.5	5.7	214.8	5.2	217.6	7.1	1100
1150			283.5	13.9	284.5	16.9	228.5	8.0	233.0	5.3	219.5	7.6	212.7	6.7	221.5	6.1	1150
1200			282.7	13.5	287.1	14.7	230.9	7.4	235.7	4.9			212.4	7.1	229.4	4.8	1200
1250					285.9	15.6	232.3	7.0	235.6	5.3			212.8	7.3	217.8	7.3	1250
1300					282.2	19.6	232.1	6.9	232.9	5.6			216.1	7.0	217.5	7.7	1300
1350					283.7	18.3	229.7	7.5	226.8	6.6			221.8	5.2	217.6	7.9	1350
1400					286.9	15.6	227.4	8.3	220.3	8.1			224.2	5.3	218.4	7.7	1400
1450					291.7	14.0	227.7	8.0	219.4	8.4			223.0	6.4	221.3	6.8	1450
1500					287.0	25.2	228.0	7.7					222.7	6.9	221.4	7.5	1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-6 15 May 71 0900 EST Double		Ascn C-7 15 May 71 0930 EST Double		Ascn C-8 15 May 71 1000 EST Double		Ascn C-1 17 May 71 1015 EST Double		Ascn C-2 17 May 71 1030 EST Single		Ascn C-3 17 May 71 1045 EST Combined		Ascn C-4 17 May 71 1100 EST Combined		Ascn C-1 19 May 71 0630 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	270.0	1.7		0.0	202.0	1.7	292.0	4.4	270.0	4.4	247.0	3.5	337.0	4.4		0.0	Sfc
50	254.4	1.0	168.0	0.8	176.1	1.6	262.7	2.7	295.8	2.2	227.2	4.5	269.4	5.8	037.9	0.5	50
100	277.1	0.9	168.0	1.6	167.9	2.2	257.8	3.2	266.9	2.2	233.3	4.0	276.7	5.3	061.8	1.2	100
150	275.6	0.7	168.4	2.3	168.1	3.1	254.2	3.8	273.3	1.8	238.9	4.4	278.5	5.0	081.0	0.8	150
200	253.8	0.5	168.8	2.9	168.2	3.9	253.8	3.8	278.7	1.6	242.5	5.3	277.4	5.0	206.5	1.5	200
250	179.5	1.1	169.1	3.5	170.0	4.5	253.8	3.8	260.5	2.1	245.7	5.5	283.9	4.5	214.2	3.5	250
300	164.5	2.1	169.4	4.1	175.9	4.3	253.8	3.8	257.9	2.8	249.4	5.3	292.4	4.1	207.3	4.2	300
350	165.3	3.2	179.2	4.8	182.3	4.1	253.8	3.7	256.2	3.5	251.1	5.0	283.7	3.0	213.2	5.3	350
400	169.2	4.4	186.5	5.5	189.2	4.0	253.6	3.7	254.4	4.1	252.5	4.7	266.2	2.1	222.3	5.8	400
450	171.4	5.6	184.0	6.0	196.3	3.9	250.8	3.6	251.8	4.4	257.5	4.5	266.8	2.2	231.7	6.4	450
500	173.0	6.8	178.9	6.5	196.2	4.3	247.9	3.5	247.5	4.1	267.0	4.5	273.9	2.6	237.0	7.7	500
550	175.2	8.4	186.1	6.7	196.1	4.7	244.9	3.5	244.4	4.2	276.2	4.6	279.1	3.0	241.8	8.0	550
600	176.7	9.9	184.9	7.1	196.0	5.0	241.7	3.4	245.4	5.1	279.6	4.9	290.6	3.4	245.4	8.5	600
650	178.3	9.0	181.2	6.5	195.9	5.4	258.3	3.9	250.0	7.3	277.4	5.4	300.4	3.9	247.5	8.7	650
700	180.7	8.1	184.1	6.9	195.8	5.8	272.8	4.0	242.2	5.7	275.5	5.9	332.9	4.2	248.2	8.8	700
750	189.6	7.3	187.3	7.0	195.8	5.7	286.5	3.7	270.6	4.4	283.4	5.9	010.4	7.0	248.7	8.8	750
800	200.5	6.6	188.7	7.5	195.7	5.6			315.7	4.8	291.2	5.9	356.4	7.7	248.9	9.6	800
850	210.2	6.8	189.3	8.1	195.7	5.5			336.4	6.1	302.6	7.0	327.2	8.7	252.7	8.1	850
900	215.3	7.8	191.4	9.1	195.7	5.4			321.9	6.2	311.1	8.4	321.6	9.7	249.8	9.5	900
950	218.3	8.3	193.2	10.0	195.6	5.3			336.9	6.5	313.1	8.9	326.2	9.8	251.0	9.4	950
1000	219.4	8.2	200.4	7.9	198.4	6.1			335.7	6.6			328.1	9.9	252.2	9.1	1000
1050	219.4	8.1	224.5	4.6	200.6	6.9			334.0	7.6					251.7	9.7	1050
1100	217.9	8.1	216.4	7.1	202.3	7.7			334.9	9.0					251.7	10.3	1100
1150	218.3	7.9	208.9	10.0	205.0	8.0									252.3	9.9	1150
1200	219.9	7.5	214.0	7.8	208.5	7.8									249.9	10.8	1200
1250	219.9	8.3	217.5	6.9	210.3	7.9									249.1	11.2	1250
1300	219.9	9.1	215.7	7.6	210.0	8.0											1300
1350	226.0	7.3	217.5	7.8	206.9	8.4											1350
1400	230.4	6.3	215.7	8.9	205.7	9.0											1400
1450	228.8	6.8	212.5	10.9	204.9	9.5											1450
1500	231.0	7.1	214.2	9.4	206.1	9.7											1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-2 19 May 71 0700 EST Double		Ascn C-3 19 May 71 0730 EST Double		Ascn C-4 19 May 71 0800 EST Combined		Ascn C-5 19 May 71 0830 EST Combined		Ascn C-6 19 May 71 0900 EST Double		Ascn C-1 20 May 71 0800 EST Combined		Ascn C-2 20 May 71 0830 EST Combined		Ascn C-3 20 May 71 0900 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0		0.0		0.0	247.0	2.6		0.0	157.0	2.6	202.0	1.7	Sfc
50	095.4	0.8	124.0	0.5	111.0	0.6	264.7	1.0	232.6	2.5	303.0	0.3	223.1	1.7	227.1	1.7	50
100	075.8	0.9	070.4	1.0	039.7	0.4	267.2	1.1	247.3	3.1	257.3	0.5	257.3	1.4	227.4	1.7	100
150	113.3	0.8	165.6	0.5	190.2	0.7	236.4	1.8	256.4	3.8	234.7	0.3	260.5	1.1	235.7	1.9	150
200	201.2	1.5	222.6	2.1	220.3	2.1	229.1	2.1	256.2	4.3	005.7	0.5	290.0	0.5	247.6	1.7	200
250	218.2	3.2	220.9	3.3	224.2	3.3	230.7	2.0	240.8	4.8	015.5	1.7	007.3	1.1	263.4	1.6	250
300	211.5	3.7	203.2	3.7	210.1	3.7	216.5	3.5	231.2	5.9	046.6	1.9	014.9	1.6	274.0	1.8	300
350	217.1	5.4	214.0	4.5	215.0	5.2	221.2	5.9	231.6	7.2	040.6	2.9	006.6	1.9	289.3	2.2	350
400	222.3	6.2	226.0	5.7	220.7	5.8	226.1	7.5	231.0	8.1	039.3	3.3	358.3	2.3	297.0	2.7	400
450	228.5	6.4	234.8	6.7	226.8	5.7	232.2	7.9	231.0	9.1	029.2	3.4	356.0	2.7	301.8	3.1	450
500	234.7	7.6	241.4	6.9	228.2	6.4	238.2	8.0	234.8	10.3	016.8	3.2	357.5	3.0	304.5	3.3	500
550	241.6	8.2	244.3	6.6	230.4	7.0	248.9	5.1	236.7	10.5	009.2	2.1	000.4	3.1	294.0	3.1	550
600	245.8	8.6	248.1	7.0	232.8	7.6	247.0	6.9	237.7	9.8	322.5	0.5	341.7	1.9	278.9	2.6	600
650	247.5	8.7	253.3	6.5	244.1	7.0	246.1	7.5	241.8	6.5	247.2	1.2	316.3	1.4	258.5	2.3	650
700	250.7	8.6	258.0	6.4	258.2	7.2	246.1	8.2	242.0	7.9	268.8	4.8	290.1	1.4	239.5	2.4	700
750	260.7	6.5	257.1	8.1	258.8	10.3	246.5	8.5	242.7	6.7	256.2	3.5	266.5	2.2	241.0	3.2	750
800	256.0	8.5	259.8	7.6	256.2	7.9	247.7	7.7	244.5	8.1	247.7	4.2	262.7	3.7	241.8	3.7	800
850	255.0	9.1	258.2	8.9	255.1	7.6	244.0	9.1	244.5	7.3	253.5	6.9	259.9	5.1	244.4	4.3	850
900	259.5	8.2	258.4	9.2	255.7	8.6	258.1	10.2	245.0	7.4	250.2	6.2	256.0	6.2	249.6	6.0	900
950	262.5	8.2	258.7	9.2	255.9	8.8	262.6	11.2	245.7	8.0	250.7	6.3	255.5	7.0	247.6	6.8	950
1000	259.3	9.9			255.9	9.3	258.6	11.4	245.8	7.5	248.6	6.9	253.9	7.3	254.4	5.7	1000
1050	259.7	9.8			256.0	9.9	260.4	10.9	247.0	6.6	243.4	7.3	236.1	8.1	251.9	8.7	1050
1100	264.0	8.1			256.2	10.6	260.1	10.9	246.5	8.1	238.7	7.4	204.5	15.4	252.6	9.2	1100
1150	258.8	10.2			255.6	10.8	258.9	11.3	246.1	8.9	240.0	7.7	237.5	10.5	253.4	9.6	1150
1200					255.2	11.0	257.5	12.2	246.1	8.0	238.3	8.5	249.5	10.0	254.6	10.1	1200
1250					255.0	11.2	256.4	13.3					247.7	10.0	253.8	7.4	1250
1300					254.1	11.0							245.6	10.2			1300
1350					253.5	11.2											1350
1400					253.2	11.7											1400

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-4 20 May 71 0930 EST Double		Ascn C-5 20 May 71 1000 EST Double		Ascn C-6 20 May 71 1030 EST Double		Ascn C-7 20 May 71 1100 EST Double		Ascn C-1 18 Oct 71 0700 EST Double		Ascn C-2 18 Oct 71 0730 EST Single		Ascn C-3 18 Oct 71 0800 EST Double		Ascn C-4 18 Oct 71 0830 EST Single		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	225.0	4.4	202.0	3.5	202.0	3.1	202.0	1.7		0.0	112.0	2.2	135.0	4.5	112.0	10.0	Sfc
50	244.5	2.9	236.9	3.5	205.0	0.7	219.8	2.1	091.2	1.9	130.0	3.2	119.2	5.9	006.9	1.4	50
100	249.2	3.3	245.0	2.8	209.9	0.7	223.9	1.9	113.3	3.0	136.6	3.9	133.4	6.7	107.6	6.6	100
150	250.3	4.1	257.0	2.2	229.9	2.2	218.5	1.4	129.4	3.3	152.5	3.2	138.2	7.7	158.1	6.6	150
200	248.7	4.4	267.6	1.6	227.4	1.3	209.4	0.9	145.0	3.5	177.5	2.8	132.6	8.6	175.1	5.6	200
250	243.9	4.2	287.3	1.1	252.8	1.2	222.5	1.2	157.8	4.0	196.6	3.0	132.6	8.5	168.5	3.2	250
300	241.6	4.1	296.8	1.2	275.1	1.4	231.0	1.5	164.7	4.7	174.9	1.7	137.1	8.6	145.8	2.9	300
350	244.1	4.0	298.9	1.5	270.0	1.8	238.1	1.6	163.2	5.7	153.4	5.1	139.7	8.6	135.7	2.9	350
400	250.1	3.6	300.6	1.9	240.9	2.7	246.2	1.6	162.1	6.7	154.9	10.0	139.6	8.3	136.3	3.0	400
450	264.5	3.3	301.7	2.4	230.7	1.9	254.2	1.7	162.2	7.4	163.1	7.1	139.3	8.1	135.2	4.1	450
500	280.8	3.8	308.7	2.2	244.3	1.9	262.2	2.0	173.5	5.8	153.9	7.9	137.7	9.0	135.6	3.4	500
550	280.8	3.9	302.4	1.9	252.7	2.5	267.8	2.6			144.9	7.9	136.4	10.0	134.5	2.7	550
600	264.1	3.4	260.9	1.9	248.7	3.4	269.0	3.0			135.5	5.9	136.3	10.1	131.7	2.3	600
650	253.3	4.5	241.8	2.4	244.4	4.4	264.7	3.1			091.2	1.6					650
700	243.2	2.5	233.5	2.9	258.3	4.9	267.0	3.5			125.4	2.9					700
750	246.6	3.5	235.8	3.4	258.3	4.4	265.6	4.2									750
800	251.8	3.9	239.2	5.0	264.7	4.5	260.7	5.5									800
850	253.6	4.7	243.2	6.6	259.6	4.9	265.5	5.9									850
900	251.5	6.4	249.0	7.2	263.3	5.5	262.1	7.4									900
950	249.9	7.5	253.7	7.7	266.4	6.2	264.0	7.3									950
1000	249.4	8.2	257.6	8.7	267.6	7.5	269.0	6.4									1000
1050	251.3	8.0	260.7	9.8	268.4	8.5	262.6	7.1									1050
1100	253.4	9.1	261.9	10.4			259.4	6.7									1100
1150	254.9	10.4	263.0	10.9			260.2	7.4									1150
1200	257.0	8.4	266.3	10.1			263.5	8.2									1200
1250	256.3	10.3	264.9	10.3			268.8	8.6									1250
1300	256.7	10.8	260.4	11.3			272.2	9.7									1300
1350	254.2	11.6					271.7	9.6									1350
1400							270.1	9.1									1400

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-5 18 Oct 71 0900 EST Double		Ascn C-6 18 Oct 71 0930 EST Double		Ascn C-7 18 Oct 71 1000 EST Double		Ascn C-8 18 Oct 71 1030 EST Double		Ascn C-9 18 Oct 71 1100 EST Combined		Ascn C-1 19 Oct 71 0700 EST Combined		Ascn C-2 19 Oct 71 0730 EST Double		Ascn C-3 19 Oct 71 0800 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mos	Z, m
Sfc	067.0	3.6	090.0	3.6	247.0	1.8	090.0	5.4	067.0	3.6	337.0	0.9		0.0	045.0	0.9	Sfc
50	117.1	5.8	090.7	2.7	334.9	1.3	092.4	3.7	117.5	3.1	042.2	0.6	068.9	0.9	099.8	0.9	50
100	111.6	4.8	101.2	2.9	005.0	1.1	113.0	3.4	123.1	3.2	027.0	2.1	071.1	1.2	069.8	0.7	100
150	111.8	4.0	106.2	2.8	032.6	1.2	134.4	3.6	128.3	3.2	071.8	2.1	074.7	1.9	088.7	2.1	150
200	120.2	3.4	114.4	2.5	051.1	1.3	131.2	3.4	132.2	3.3	102.2	3.2	076.3	2.7	126.4	4.2	200
250	136.4	3.2	141.4	2.1	067.9	1.3	125.7	3.2	134.4	3.2	118.1	5.0	095.6	3.0	135.1	5.0	250
300	156.1	3.6	171.6	2.2	084.1	1.3	122.3	3.2	132.6	2.8	122.7	5.0	110.9	3.7	140.2	4.8	300
350	170.7	4.3	193.1	1.7	091.7	1.3	122.9	3.6	123.2	2.8	131.2	4.9	121.3	4.2	145.7	5.2	350
400	173.8	4.5	223.4	1.6	096.4	1.3	123.3	4.1	112.3	2.9	145.8	6.2	130.1	4.2	148.7	5.9	400
450			230.2	2.1	101.6	1.2	131.4	4.2	112.1	2.7	137.8	5.7	138.5	4.4	148.8	7.1	450
500			227.9	2.6	124.1	1.9	139.9	4.3	113.9	2.4	087.5	5.4	143.2	4.5	148.8	7.8	500
550			225.7	2.7	135.4	2.8	144.2	4.5	122.9	2.1	077.3	0.8	143.2	4.5			550
600			222.1	2.3	139.3	3.4	144.9	5.0	140.3	1.8	119.5	12.4					600
650			219.7	2.2			143.1	6.0	161.1	1.7	121.9	12.6					650
700							141.5	7.4	151.2	2.6	121.5	11.7					700
750							140.2	9.0	146.2	3.5	121.3	10.5					750
800							139.5	10.4	141.1	5.1	122.1	9.8					800
850									136.9	7.5	121.7	9.2					850
900									135.5	9.8	120.4	8.6					900
950									135.7	11.6	118.0	7.9					950
1000									136.5	12.5	122.3	7.3					1000
1050									138.5	11.8	122.1	6.7					1050
1100									140.7	11.1	104.6	6.1					1100
1150									143.1	10.6	115.3	5.9					1150
1200									144.3	10.4	122.5	5.6					1200
1250									141.3	11.1	121.9	5.2					1250
1300									138.7	11.9	121.9	5.6					1300
1350									136.2	13.6	121.1	5.7					1350
1400									134.3	15.1	119.9	5.5					1400
1450									132.4	15.7	118.4	5.0					1450
1500									130.6	16.2							1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-4 19 Oct 71 0830 EST Double		Ascn C-5 19 Oct 71 0900 EST Single		Ascn C-6 19 Oct 71 0930 EST Double		Ascn C-7 19 Oct 71 1000 EST Double		Ascn C-8 19 Oct 71 1030 EST Double		Ascn C-9 19 Oct 71 1100 EST Double		Ascn C-1 20 Oct 71 0630 EST Single		Ascn C-2 20 Oct 71 0700 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	067.0	0.9	315.0	1.8	112.0	1.3	067.0	0.9		0.0	067.0	1.8	112.0	4.5	202.0	3.6	Sfc
50	024.0	0.6	352.8	0.2	037.3	1.2	046.2	0.5	089.8	1.3	110.7	1.4	083.6	1.8	123.1	1.0	50
100	033.5	1.5	010.0	1.0	026.3	1.1	144.4	0.8	107.7	1.3	114.6	2.2	135.7	6.0	134.9	0.2	100
150	071.0	1.6	102.4	1.2	014.8	1.0	160.9	2.1	129.5	1.7	117.6	3.0	146.5	5.0	296.2	0.6	150
200	105.6	2.4	104.5	1.5	087.5	1.0	163.0	3.2	143.5	2.9	124.4	3.7	171.6	3.7	241.5	0.4	200
250	124.9	4.2	104.7	2.4	117.4	2.0	162.0	4.1	154.0	4.3	128.4	4.4	197.5	4.7	187.6	0.6	250
300	135.7	5.6	147.9	4.1	131.4	3.3	158.1	5.1	164.0	6.0	126.6	4.4	195.2	6.9	146.1	1.7	300
350	143.9	6.8	146.0	5.9	142.2	5.0	146.2	6.3	169.4	7.9	141.2	4.1	175.3	4.9	135.3	3.2	350
400	144.7	7.6	132.5	7.8	147.3	6.8	138.3	7.7	168.3	6.9	165.9	4.2	102.3	3.9	133.6	4.5	400
450	144.7	8.2	125.4	11.6	144.8	8.1	134.5	8.6	166.7	6.0	166.5	4.5			137.2	5.1	450
500			120.1	11.1	141.8	9.3	133.1	9.1	156.9	5.4	160.6	4.7			140.1	5.7	500
550			118.1	9.0	138.3	10.0	131.7	9.5	142.0	5.3	152.5	5.1			133.2	7.3	550
600			120.1	6.3	133.6	10.1	131.4	10.1	130.9	6.5	138.2	6.1			127.3	9.3	600
650			115.9	5.3	130.1	12.2	131.4	10.9	128.1	9.4	128.2	7.3			124.9	10.5	650
700			112.0	5.2	125.7	12.8	128.9	13.1	126.4	12.2	122.2	9.0					700
750			109.6	5.0	117.2	12.4	117.8	14.0	124.4	14.7	118.9	11.1					750
800			106.2	4.7	115.4	11.7	113.1	13.3	119.8	13.6	116.7	13.0					800
850			101.5	4.4	113.7	10.5	111.4	13.0	111.2	13.7	114.7	13.2					850
900			098.1	4.3	110.5	9.2	110.8	13.0	112.4	13.7	112.7	14.0					900
950			090.7	3.7	108.2	8.7	109.7	12.2	110.0	12.7	110.8	15.3					950
1000			089.4	4.3	107.2	8.8	106.9	10.3	105.5	11.3	108.7	14.3					1000
1050			089.8	4.4	106.7	9.3	102.9	8.4	103.5	11.2	105.7	12.5					1050
1100			088.8	4.2	106.5	10.0	104.8	9.6	101.4	10.8	099.7	11.0					1100
1150			085.9	4.6	103.2	8.0	106.2	10.9	098.0	9.1	095.4	10.3					1150
1200					085.3	3.7	106.0	11.2	093.3	7.6	092.2	9.8					1200
1250					101.8	6.8	105.0	10.9	092.2	7.9	083.8	8.1					1250
1300					106.4	9.5	104.0	10.6	091.0	8.3	078.1	7.8					1300
1350					099.2	7.0	104.0	10.6	084.0	7.2	082.0	9.6					1350
1400					091.5	6.0			074.8	6.4	083.3	10.7					1400
1450					092.7	7.6			080.3	7.5	078.8	9.4					1450
1500					085.6	6.8			085.2	8.9	072.9	8.2					1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-3 20 Oct 71 0730 EST Double		Ascn C-4 20 Oct 71 0800 EST Double		Ascn C-5 20 Oct 71 0830 EST Double		Ascn C-6 20 Oct 71 0900 EST Double		Ascn C-7 20 Oct 71 0930 EST Double		Ascn C-8 20 Oct 71 1000 EST Combined		Ascn C-9 20 Oct 71 1030 EST Double		Ascn C-10 20 Oct 71 1100 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	045.0	2.7	135.0	6.7	157.0	3.6	112.0	4.5	112.0	2.7	112.0	2.7	090.0	5.4	090.0	4.5	Sfc
50	082.8	2.4	144.6	3.2	213.3	3.5	129.7	3.3	091.2	3.5	146.0	5.1	109.9	4.7	092.7	4.3	50
100	106.5	1.6	124.3	3.8	217.2	3.5	146.2	3.6	120.4	2.6	146.9	7.0	107.9	4.7	092.1	4.7	100
150	147.1	1.5	141.4	3.6	212.0	3.4	156.1	4.2	148.7	2.6	145.3	6.7	110.7	4.5	092.8	5.0	150
200	168.9	2.0	139.7	5.2	189.1	3.2	159.1	4.6	127.5	2.8	139.4	5.9	126.2	4.4	098.3	5.1	200
250	176.2	2.7	141.9	6.2	166.8	3.5	158.8	4.3	110.8	3.3	132.8	6.2	141.4	4.6	103.4	5.1	250
300	180.5	3.4	147.8	6.5	163.6	3.1	144.1	4.0	123.2	5.8	135.1	7.3	149.3	4.8	108.4	4.8	300
350	174.3	3.7	149.4	7.0	160.0	2.7	134.2	7.2	129.1	8.5	138.1	8.5	148.0	4.7	114.4	4.1	350
400	163.7	4.0	148.1	7.7	155.0	2.2	142.5	8.0	132.5	8.7	142.9	7.1	146.7	4.6	121.7	4.4	400
450	154.6	4.4	147.8	8.0	137.9	1.7	146.1	9.1	134.1	8.1	141.3	7.1	145.3	4.6	128.7	4.8	450
500	145.8	5.4	153.5	6.7	095.8	1.5	150.5	10.1	134.2	7.2	140.9	5.7	143.5	4.6	142.2	4.9	500
550	139.7	6.5	161.9	5.4	062.5	2.1	145.2	8.9	131.3	6.0	134.0	6.6	141.8	4.6	151.6	4.9	550
600	135.4	7.7	162.3	5.5	052.9	2.5	140.6	8.1	140.0	5.4	157.8	4.3	149.0	4.5	148.1	4.0	600
650	134.5	8.1	160.3	6.3					148.0	5.7	223.2	1.5	157.3	4.7	142.8	3.7	650
700	134.5	8.1	157.7	8.0					150.5	6.9	184.5	2.6	158.4	4.9	137.9	4.2	700
750			148.8	7.6					156.0	7.3	162.7	4.7	158.8	5.8	134.6	4.7	750
800			141.0	7.3					161.3	8.0			158.6	6.8	149.3	4.8	800
850									164.6	10.0			155.4	8.4	162.6	5.1	850
900									165.4	10.6			156.3	9.1	165.1	7.0	900
950													157.1	11.1	164.7	9.3	950
1000													151.4	13.4	162.2	11.2	1000
1050													147.0	14.7	158.7	12.9	1050
1100													143.7	13.6	156.0	14.6	1100
1150													140.9	12.1	153.0	13.2	1150
1200													140.1	12.2	147.7	11.3	1200
1250													139.5	13.5	147.4	10.3	1250
1300													138.0	10.5	146.0	10.0	1300
1350													142.3	9.0	142.5	11.5	1350
1400													144.2	10.9	142.3	10.9	1400
1450													145.7	11.4	144.2	8.9	1450
1500													146.4	10.5	144.9	8.9	1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-1 21 Oct 71 0630 EST Double		Ascn C-2 21 Oct 71 0700 EST Double		Ascn C-3 21 Oct 71 0730 EST Double		Ascn C-4 21 Oct 71 0800 EST Double		Ascn C-5 21 Oct 71 0830 EST Double		Ascn C-6 21 Oct 71 0900 EST Double		Ascn C-7 21 Oct 71 0930 EST Double		Ascn C-8 21 Oct 71 1000 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0		0.0		0.0		0.0	090.0	0.9	180.0	0.9	180.0	0.9	Sfc
50	000.6	0.4	332.8	0.6	049.3	0.5	138.1	0.2	238.8	0.8	054.6	0.9	208.0	1.1	270.0	0.7	50
100	102.3	0.8	308.4	0.5	309.6	0.5	228.3	0.5	253.7	0.7	348.8	0.7	242.1	0.3	060.3	0.3	100
150	107.0	1.0	201.1	1.0	185.7	0.6	211.1	0.7	244.1	0.8	306.9	1.0	357.3	0.5	113.9	0.7	150
200			189.8	1.9	157.4	2.0	196.4	1.6	219.2	1.3	238.0	0.8	028.2	0.8	150.6	1.3	200
250			186.3	2.2	170.1	3.2	195.4	3.5	206.6	2.4	180.3	2.3	116.1	0.7	160.4	2.6	250
300			184.9	3.8	179.9	4.4	176.5	4.3	187.7	4.4	169.1	4.8	168.0	2.9	167.8	4.0	300
350			183.3	4.9	176.5	6.9	176.0	5.7	186.4	6.9	171.8	6.8	172.9	5.0	173.9	5.5	350
400			179.6	4.9	177.1	8.2	178.6	7.0	187.9	9.4	174.4	7.4	174.2	6.4	171.4	6.4	400
450			177.4	5.1	182.2	7.4	180.9	6.1	178.0	8.6	178.3	6.8	176.9	6.9	172.7	6.1	450
500			181.9	5.8	189.6	6.3	185.5	6.4	178.0	6.9	189.0	5.8	182.1	6.5	175.6	5.4	500
550			185.4	6.6	184.6	12.2	189.7	7.9	187.9	6.3	197.5	5.2	184.3	4.8	176.6	5.2	550
600			186.5	4.6	186.2	8.4	193.3	5.6	195.4	5.7	202.7	4.9	185.7	2.8	177.4	4.9	600
650			188.5	5.0	190.3	4.8	197.0	4.0	201.8	4.4	201.8	4.1	175.9	1.7	179.8	3.9	650
700			189.7	7.0	194.9	3.9	198.8	3.0	215.5	1.5	208.1	2.8	156.1	1.5	185.4	2.6	700
750			192.3	5.1	200.1	3.5	208.4	1.7	132.8	1.2	249.7	1.2	147.1	2.2	169.3	2.4	750
800			195.5	3.5	203.1	2.0	158.6	1.1	133.5	2.2	143.7	0.7	129.9	3.0	150.8	2.9	800
850			198.8	2.3	183.3	1.1	092.6	1.1	129.5	2.9	129.2	2.4	127.0	3.7	144.2	4.0	850
900			203.9	1.4	166.3	1.9	150.6	2.1	118.6	3.4	124.0	3.4	128.8	3.9	137.8	4.1	900
950			200.1	1.1	142.7	1.0	164.5	3.0	108.6	3.2	119.6	3.8	131.2	3.4	134.5	3.8	950
1000			165.4	1.5	172.6	1.6	161.5	2.0	113.5	3.1	130.3	3.5	136.5	3.3	144.3	3.9	1000
1050			153.5	1.5	184.6	2.7	167.5	3.1	131.5	3.2	142.7	3.8	144.1	3.5	155.4	4.1	1050
1100			155.5	2.6	187.4	3.0	161.5	2.9	148.6	4.0	150.2	4.5	151.2	4.0	157.4	4.9	1100
1150			169.7	5.1	183.8	2.5	158.1	4.9	153.3	4.5	152.2	5.5	156.2	4.9	155.6	6.0	1150
1200			162.7	4.6	174.5	5.5	155.1	5.5	150.9	4.6	143.5	5.0	151.7	5.6	147.7	5.1	1200
1250			150.3	4.0	168.8	5.2	149.1	4.7	142.3	4.7	142.4	5.8	146.1	5.7	141.1	5.0	1250
1300			152.2	4.9	159.7	4.1	149.2	4.9	148.0	5.9	143.1	6.4	135.3	4.7	138.7	5.5	1300
1350			155.1	6.0	153.3	4.2	149.2	5.0	151.1	6.7	132.1	4.8	138.1	5.4	139.4	6.0	1350
1400											142.8	6.1	138.9	5.7	139.6	6.2	1400
1450											147.4	7.0	139.0	5.7			1450
1500													136.6	5.6			1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-9 21 Oct 71 1030 EST Double		Ascn C-1 22 Oct 71 0630 EST Double		Ascn C-2 22 Oct 71 0700 EST Double		Ascn C-3 22 Oct 71 0730 EST Combined		Ascn C-4 22 Oct 71 0800 EST Single		Ascn C-5 22 Oct 71 0830 EST Double		Ascn C-6 22 Oct 71 0900 EST Double		Ascn C-7 22 Oct 71 0930 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0		0.0	202.0	2.0		0.0	157.0	0.9	157.0	1.3	225.0	2.7	Sfc
50	083.4	0.1	230.6	1.3	232.1	0.7	189.0	4.0	215.1	1.1	187.1	2.4	229.2	0.6	213.7	2.3	50
100	120.1	0.7	167.5	2.5	209.0	0.8	180.1	4.9	196.0	1.1	188.8	2.7	188.5	0.6	208.4	2.1	100
150	121.1	1.2	147.6	5.0	191.8	1.0	175.5	5.6	176.3	2.3	180.7	2.6	165.6	1.0	202.1	1.9	150
200	102.0	1.3	150.4	6.7	161.3	1.7	173.8	5.9	166.6	3.5	172.0	2.6	160.0	1.6	205.0	1.9	200
250	105.2	1.1	155.2	8.0	149.4	2.5	172.4	6.2	154.0	4.1	173.0	2.9	162.8	2.6	209.5	1.9	250
300	126.4	1.1	155.2	7.3	150.5	3.7	172.0	6.8	170.1	5.0	173.9	3.2	164.1	3.6	213.7	2.0	300
350	135.8	1.8	157.8	7.2	160.0	5.7	171.7	7.3	184.8	4.9	174.6	3.6	167.7	4.2	215.3	2.4	350
400	145.4	2.8	164.7	8.7	164.6	7.9	179.0	7.1	201.3	4.5	174.8	3.6	176.7	4.3	216.4	2.9	400
450	153.6	4.0	170.2	11.2	164.8	9.0	187.7	6.9	200.6	5.3			185.3	4.5	217.0	3.3	450
500	157.7	4.4	174.8	16.6	164.3	9.9	181.4	8.5	202.5	6.0			189.5	4.6	217.0	3.3	500
550	161.8	4.0	177.2	21.1	165.6	10.5	181.3	6.0	204.8	6.6							550
600	165.1	4.1	180.9	15.8	171.1	10.5	181.4	7.7	206.7	7.0							600
650	166.1	4.3	187.3	11.1	176.6	10.5	179.8	18.7									650
700	159.5	5.0			186.6	10.0	185.8	13.6									700
750	150.5	5.3			197.4	9.8	191.9	11.8									750
800	136.9	5.4			199.5	9.8	195.0	12.4									800
850	135.9	5.4					199.5	11.5									850
900	139.5	5.2					204.7	10.5									900
950	149.1	4.7					209.2	9.3									950
1000	151.6	5.4					210.5	8.6									1000
1050	152.0	6.3					207.3	8.3									1050
1100	151.9	7.2					206.7	8.9									1100
1150	147.2	6.4					207.0	9.7									1150
1200	141.9	6.0					209.1	11.2									1200
1250	138.5	6.4					210.0	12.1									1250
1300	134.3	5.0					209.6	11.8									1300
1350	131.6	4.1					209.5	11.7									1350
1400	132.8	4.4															1400
1450	132.0	5.0															1450
1500	128.2	4.9															1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-8 22 Oct 71 1000 EST Double		Ascn C-9 22 Oct 71 1030 EST Double		Ascn C-1 2 Nov 71 0730 EST Single		Ascn C-2 2 Nov 71 0930 EST Single		Ascn C-3 2 Nov 71 1000 EST Single		Ascn C-4 2 Nov 71 1030 EST Single		Ascn C-5 2 Nov 71 1100 EST Single		Ascn C-6 2 Nov 71 1130 EST Single		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	157.0	5.4	225.0	3.6	247.0	4.5	247.0	6.7	225.0	8.0	225.0	7.2	247.0	7.2	247.0	7.2	Sfc
50	159.1	7.0	209.2	2.8	246.7	7.5	213.2	4.0	232.9	5.7	220.6	7.7	242.6	4.1	245.3	7.5	50
100	162.4	7.0	200.2	2.7	248.9	9.0	234.1	5.8	230.1	7.4	228.5	5.9	236.4	4.4	249.3	8.1	100
150	167.2	6.1	197.6	3.1	243.9	10.2	236.4	8.3	230.2	8.8	238.2	5.6	230.6	5.2	249.0	7.7	150
200	173.9	5.3	195.7	3.6	234.2	11.3	232.3	11.0	231.9	9.8	243.8	6.8	226.5	6.6	244.2	6.6	200
250	183.9	4.9	188.3	3.7	232.8	12.1	231.5	12.7	234.8	9.6	245.2	9.4	237.9	8.8	230.4	7.1	250
300	195.6	4.6	179.7	3.7	232.8	13.1	230.9	14.1	236.5	10.4	245.1	11.1	243.6	11.3	223.1	8.4	300
350	199.9	4.6	173.2	3.8	233.5	14.8	230.2	15.1	235.2	13.6	243.0	10.7	243.1	13.7	226.1	10.2	350
400	197.8	4.7	178.1	4.0	232.6	13.8	230.7	15.8	234.5	14.4	242.8	11.9	243.2	15.0	227.3	11.2	400
450	195.8	4.8	182.4	4.2	232.4	12.5	231.5	16.0	234.7	14.1	243.3	13.3	242.8	15.3	229.0	11.7	450
500	195.1	4.8	185.9	4.5	238.7	14.0	232.5	15.2	238.3	12.8	243.9	13.4	239.6	14.1	235.4	11.0	500
550			188.3	5.0	240.5	14.6	233.5	15.2	242.8	14.4	243.6	14.5	240.9	14.1	237.9	11.6	550
600			190.0	5.4			234.8	15.7	245.9	17.1	243.0	16.3	244.0	15.0	240.5	11.8	600
650							237.9	16.0	247.7	18.9	243.1	18.2	245.9	17.4	259.2	8.1	650
700							239.6	17.4	252.2	20.1	243.5	19.0	247.1	19.1			700
750							240.9	19.1	255.8	20.7	244.3	19.3	249.4	19.5			750
800							242.4	20.6			245.9	19.6	255.6	17.7			800
850							243.0	22.4			248.5	19.4	246.3	17.2			850
900							243.2	23.3			249.8	19.3	240.8	17.2			900

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-1 3 Nov 71 0730 EST Double		Ascn C-2 3 Nov 71 0800 EST Combined		Ascn C-3 3 Nov 71 0830 EST Single		Ascn C-4 3 Nov 71 0900 EST Double		Ascn C-5 3 Nov 71 0930 EST Double		Ascn C-6 3 Nov 71 1000 EST Double		Ascn C-7 3 Nov 71 1030 EST Combined		Ascn C-8 3 Nov 71 1100 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0	247.0	0.9	270.0	1.3	247.0	1.3	270.0	2.2	270.0	2.7	270.0	3.6	Sfc
50	289.3	2.4	268.6	1.6	241.3	2.4	267.5	2.9	244.4	3.1	252.5	6.0	267.5	4.5	262.7	5.9	50
100	272.7	3.2	265.5	2.7	248.2	3.4	273.7	2.9	254.1	3.5	255.7	6.7	271.1	4.9	264.6	6.6	100
150	269.2	3.5	271.7	2.9	252.8	4.4	275.3	2.7	264.6	3.8	255.2	5.4	268.5	5.2	261.7	5.9	150
200	264.3	3.9	274.0	3.3	259.0	5.5	255.9	2.4	267.1	3.7	259.0	6.1	261.1	5.5	255.4	6.4	200
250	261.9	4.3	274.4	3.7	263.1	5.5	239.6	2.6	268.7	3.6	254.5	5.1	255.2	5.6	257.2	6.0	250
300	264.0	4.6	274.3	3.7	269.9	3.0	232.3	3.2	267.8	3.8	256.3	4.8	253.1	3.1	257.9	6.0	300
350	267.9	4.4	276.6	3.3	256.0	2.0	237.9	3.7	266.8	4.1	255.6	5.7	236.6	0.7	252.0	7.3	350
400	276.1	3.9	281.2	3.7	228.1	3.3	251.8	4.2	264.2	4.4	259.6	6.1	259.6	5.5	255.0	6.0	400
450	282.3	3.5	288.5	3.9	234.4	3.6	262.6	4.4	260.0	4.9	262.4	6.7	261.0	10.3	260.1	7.9	450
500	282.6	3.1	294.3	3.8	250.9	3.6	273.7	4.3	256.7	5.3	263.2	7.3	262.3	8.2	262.9	6.1	500
550	280.2	2.9	290.5	3.8	256.8	4.9	277.2	4.3	256.7	5.3	264.8	7.1	264.5	6.2	265.2	6.8	550
600			287.0	3.7	259.2	6.0	277.6	4.2			268.8	5.5	264.8	5.5	265.6	7.6	600
650			291.1	3.6							265.7	7.9	264.5	6.0	262.2	9.2	650
700			298.7	3.0							262.3	9.7	264.7	7.1	258.7	7.1	700
750			298.9	3.8							268.3	3.5	268.4	7.7			750
800			298.4	3.8							259.1	11.8	266.8	8.2			800
850			302.5	3.7							258.4	15.3	262.3	8.6			850
900			303.0	3.5							256.7	11.2	255.3	8.6			900
950			299.0	3.4							257.8	9.7	251.1	10.3			950
1000			292.5	3.5							259.9	10.2	251.4	11.9			1000
1050			284.4	4.7									257.1	13.0			1050
1100			280.1	6.1									263.6	14.3			1100
1150			278.3	7.5									270.0	15.6			1150
1200			277.8	8.2									270.3	16.7			1200
1250													270.6	17.6			1250
1300													272.7	17.8			1300
1350													274.2	17.9			1350
1400													275.1	18.1			1400
1450													276.0	18.0			1450
1500													277.0	17.9			1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-9 3 Nov 71 1130 EST Double		Ascn C-10 3 Nov 71 1200 EST Combined		Ascn C-1 4 Nov 71 0730 EST Double		Ascn C-2 4 Nov 71 0800 EST Single		Ascn C-3 4 Nov 71 0830 EST Single		Ascn C-4 4 Nov 71 0900 EST Double		Ascn C-5 4 Nov 71 0930 EST Combined		Ascn C-6 4 Nov 71 1000 EST Combined		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	270.0	3.6	247.0	4.5	315.0	3.1	270.0	3.6	315.0	3.6	270.0	3.1	270.0	5.4	270.0	5.8	Sfc
50	271.3	5.5	272.7	8.1	258.4	7.8	254.0	8.0	267.0	8.1	248.0	6.6	248.1	13.4	253.8	9.9	50
100	270.8	5.5	271.6	8.5	263.4	9.3	256.6	9.3	264.3	11.0	250.9	6.6	252.6	6.5	252.9	8.8	100
150	260.5	5.6	261.5	8.5	282.5	4.2	258.5	9.9	269.5	13.7	262.5	5.9	263.0	9.8	255.9	9.9	150
200	248.4	6.0	251.6	8.7			259.9	9.7	272.4	14.3	268.8	5.6	265.2	9.0	258.5	11.1	200
250	240.6	6.5	249.5	9.1			260.7	8.4	274.8	12.3	272.5	6.2	264.8	11.2	261.4	9.9	250
300	245.8	5.8	250.7	9.5			259.6	7.6	277.7	10.5	263.6	6.9	267.6	10.2	265.3	8.5	300
350	244.7	5.3	251.8	9.9			267.3	7.6	278.0	10.2	256.5	7.8	271.7	8.0	270.1	8.4	350
400	242.9	5.3	254.8	9.9			278.2	8.2	278.4	9.9	256.7	8.8	269.6	6.8	273.6	10.0	400
450	250.8	6.0	259.4	9.6					270.7	8.4	259.8	9.8	266.3	8.9	276.2	11.5	450
500	251.4	5.6	263.3	10.0					257.6	6.9	262.6	10.7	270.1	13.4	281.1	9.5	500
550	247.0	4.4	264.1	11.8					251.6	6.7	265.3	11.3	271.7	11.4	288.5	7.6	550
600	249.9	5.4	263.4	11.3					252.7	7.3	267.9	11.6	275.5	10.0	287.8	7.4	600
650	254.5	7.8	262.3	9.7					258.9	8.1	270.9	9.9	281.8	5.5	283.6	8.0	650
700	257.6	8.9	261.4	9.1					270.3	9.4	275.6	8.4	284.8	6.1	280.5	8.7	700
750	260.8	9.1	261.7	11.2					277.8	10.7	283.2	7.8	281.1	7.5	278.3	9.6	750
800	265.4	8.3	262.1	12.2					281.2	11.5	287.4	7.6	274.6	8.3	276.6	10.9	800
850	270.3	7.6	262.7	12.7					284.4	12.4			271.3	8.8	275.5	12.5	850
900	267.8	9.1	262.9	12.8					288.6	13.4					275.0	13.7	900
950	267.8	10.9	263.1	13.0					292.1	14.5					274.8	14.7	950
1000	268.1	12.5	265.1	14.3					293.4	15.1					274.8	15.1	1000
1050	269.5	13.1	266.3	15.2					294.6	15.7							1050
1100	270.8	13.7	265.9	14.8					296.6	16.1							1100
1150	283.9	10.5	266.1	14.5					298.5	16.5							1150
1200	281.2	14.1	267.1	14.3													1200
1250	278.5	16.6	270.2	14.5													1250
1300			274.2	15.0													1300
1350			270.7	13.4													1350
1400			264.3	11.4													1400
1450			262.3	10.7													1450
1500			261.7	9.7													1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-7 4 Nov 71 1030 EST Combined		Ascn C-8 4 Nov 71 1100 EST Double		Ascn C-1 5 Nov 71 0730 EST Double		Ascn C-2 5 Nov 71 0800 EST Combined		Ascn C-3 5 Nov 71 0830 EST Double		Ascn C-4 5 Nov 71 0900 EST Double		Ascn C-5 5 Nov 71 0930 EST Double		Ascn C-6 5 Nov 71 1000 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	270.0	4.5	270.0	5.8		0.0		0.0		0.0		0.0		0.0		0.0	Sfc
50	246.4	5.4	260.2	6.2	228.5	0.3	126.6	0.7	082.6	0.7	112.4	0.8	074.2	0.2	149.3	0.5	50
100	248.9	7.1	253.1	6.2	228.5	0.6	094.8	0.8	049.7	1.1	060.1	0.8	153.8	0.6	137.5	0.6	100
150	248.3	7.9	245.3	6.0	228.5	1.0	164.1	0.5	128.2	0.5	132.1	0.1	220.1	0.3	119.9	0.5	150
200	248.9	7.4	242.9	7.1	228.5	1.3	209.5	1.5	189.8	1.5	209.3	1.1	252.6	0.8	079.0	0.5	200
250	254.1	6.8	242.5	8.5	231.3	1.9	208.3	2.6	204.3	2.5	206.4	2.3	211.6	2.4	192.7	2.4	250
300	255.6	6.4	243.0	8.6	235.7	3.1	209.3	3.1	212.1	4.1	209.7	4.4	209.1	4.4	200.7	4.9	300
350	258.4	6.0	244.4	7.4	237.7	4.3	212.4	3.8	212.6	5.3	211.9	6.5	212.2	6.4	207.5	6.9	350
400	252.4	8.1	246.4	7.4	238.8	5.5	220.4	4.9	210.9	6.0	216.5	6.9	216.6	7.3	213.1	6.9	400
450	250.7	9.5	246.4	7.4	239.5	6.7	227.6	5.9	215.3	6.1	218.0	7.4	218.6	7.6	220.5	6.1	450
500	250.7	10.3	245.1	7.5	239.9	8.0	239.1	6.7	223.8	6.1	218.1	7.9	218.8	6.9	223.5	5.5	500
550	252.1	12.2	241.7	8.3	240.9	8.2	240.0	7.6	229.3	6.3	222.9	7.4	219.0	6.7	222.5	5.1	550
600	254.0	15.2	240.7	7.9	242.7	7.4	237.9	7.9	231.8	6.9	227.1	6.7	217.9	6.4	217.9	6.2	600
650	254.4	14.9	247.8	4.8	244.7	6.6	241.5	6.4	231.1	6.2	228.5	5.5	215.3	6.3	214.2	8.0	650
700	253.1	9.9	276.3	4.7	249.9	5.6	244.0	6.3	232.7	5.4	225.8	6.3	213.4	7.0	215.6	7.2	700
750	256.4	8.8	275.2	6.2	259.0	5.8	247.7	6.6	239.2	5.1	223.6	5.9	214.1	6.6	217.6	6.5	750
800	261.8	10.6	270.5	7.2	263.7	7.2	254.2	6.6	249.9	6.0	227.3	5.7	224.2	5.4	220.4	6.2	800
850	265.0	11.0	266.3	7.9	264.7	9.1	262.0	7.6	258.9	7.5	237.7	6.4	242.8	5.2	234.9	5.0	850
900	269.3	12.6	269.1	7.3	266.1	7.4	264.3	8.7	269.6	6.5	260.0	6.2	249.3	7.4	248.1	5.6	900
950	271.2	14.3	272.4	6.9	270.0	6.5	261.8	9.7	264.6	7.3	272.2	6.1	276.7	5.4	254.6	6.4	950
1000	271.3	15.3	270.2	9.9	267.3	6.6	263.7	9.6	264.3	6.6	265.8	5.4	261.0	5.9	267.5	5.0	1000
1050	280.1	10.6	269.5	11.6	264.1	7.0	265.2	9.2	265.7	6.2	260.7	6.9	266.6	5.0	253.2	5.8	1050
1100	284.8	9.2			266.2	5.6	264.9	8.6	267.0	6.7	260.8	7.9	258.4	7.1	265.0	4.7	1100
1150					267.1	5.8	262.4	8.4	266.6	7.7	284.4	4.6	279.7	5.2	262.9	6.0	1150
1200					269.9	7.5	260.6	8.3	266.5	8.0	289.9	5.2	288.3	5.4	281.3	4.9	1200
1250					271.4	8.1	261.3	7.8			292.6	5.8	282.8	6.2	286.3	4.9	1250
1300							262.6	7.6							291.3	4.5	1300
1350							265.0	7.4							307.7	4.0	1350
1400							271.1	6.8							288.3	5.6	1400
1450							287.2	6.5							286.7	5.8	1450
1500							302.2	6.9									1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-7 5 Nov 71 1030 EST Double		Ascn C-8 5 Nov 71 1100 EST Double		Ascn C-9 5 Nov 71 1130 EST Combined		Ascn C-10 5 Nov 71 1200 EST Double		Ascn C-1 6 Nov 71 0730 EST Combined		Ascn C-2 6 Nov 71 0800 EST Combined		Ascn C-3 6 Nov 71 0830 EST Combined		Ascn C-4 6 Nov 71 0900 EST Combined		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	180.0	0.9		0.0	180.0	0.9		0.0		0.0		0.0		0.0		0.0	Sfc
50	245.7	0.3	228.5	0.6	155.5	1.4	170.7	0.6	089.9	0.9	073.4	0.8	083.0	1.2	079.4	0.9	50
100	034.9	0.1	230.9	0.8	157.3	1.6	151.0	1.1	060.5	1.5	070.4	0.9	063.1	0.8	056.2	0.3	100
150	295.6	0.2	233.5	1.0	149.2	1.7	168.1	2.2	049.4	0.5	119.8	0.6	110.1	0.2	240.9	0.4	150
200	221.0	1.1	248.2	1.2	139.3	1.7	173.4	1.8	212.8	1.7	197.7	1.7	202.9	2.0	225.3	1.8	200
250	209.8	3.0	250.9	1.7	122.7	1.0	204.3	1.2	210.6	4.7	210.3	3.9	207.5	4.2	223.5	3.3	250
300	209.2	4.6	246.2	2.7	064.8	0.6	221.8	1.0	210.6	7.5	215.2	5.5	214.0	6.1	221.3	4.8	300
350	210.3	5.9	242.5	3.5	067.0	0.5	171.0	1.1	212.9	9.1	217.3	7.2	214.4	7.9	219.7	6.4	350
400	215.6	6.0	237.6	4.1	094.1	0.5	147.2	1.5	214.4	10.7	214.7	8.1	212.4	9.5	218.9	8.1	400
450	220.6	5.9	233.9	4.6	136.5	0.4	126.5	1.7	215.6	12.3	214.4	9.5	219.2	6.8	219.3	10.4	450
500	219.9	5.7	227.2	4.6	224.1	0.8	158.7	1.5	218.8	13.1	218.2	12.6	217.0	11.6	219.7	11.2	500
550	214.6	5.9	220.2	4.6	233.2	1.6	169.1	1.5	223.0	13.5	222.1	14.0	220.3	12.6	222.4	10.9	550
600	214.4	6.4	216.6	4.7	217.9	2.9	184.5	2.8	227.4	14.0	228.2	13.3	223.8	13.7	231.1	13.5	600
650	213.7	6.2	217.6	5.0	213.0	3.9	195.1	3.2	234.6	14.1	233.3	14.4	230.1	15.8	235.7	12.1	650
700	212.5	5.4	219.7	5.1	213.5	3.9	205.0	3.5	239.5	11.3	235.0	12.9	234.1	16.0	238.1	13.4	700
750	212.3	5.4	226.0	4.7	220.2	4.1	200.1	3.8	241.4	11.5	235.9	10.9	236.6	15.8	238.7	14.3	750
800	214.9	5.4	233.7	4.7	231.4	4.7	194.1	4.1	245.0	11.9	234.4	12.2	237.6	15.5	241.0	14.0	800
850	230.0	4.8	238.2	5.2	230.5	4.8	192.9	4.1	248.0	11.9	235.4	13.6	238.5	15.3	243.7	13.6	850
900	247.3	4.5	235.2	5.4	230.8	4.6	194.8	4.2	245.6	14.0	237.5	13.9	238.9	14.6	246.2	13.5	900
950	241.5	5.7	233.6	5.1	240.9	3.8	204.4	4.1	246.1	14.5	238.3	14.0	239.2	14.1	246.0	13.2	950
1000	241.8	5.0	238.6	5.6	246.7	3.6	224.5	3.3	246.5	15.8	240.7	14.0	239.1	14.8	244.8	12.5	1000
1050	242.7	4.5	239.4	5.1	253.2	4.1	239.6	2.8	247.2	17.1	242.8	14.5	240.0	14.8	244.8	11.7	1050
1100	245.5	4.6	262.9	3.1	256.7	4.1	236.8	2.7	249.4	16.9	244.7	14.4	241.0	15.1	246.2	11.2	1100
1150	253.4	4.6	260.3	4.7	258.7	3.7	237.0	2.6	250.9	16.9	247.1	13.1	242.2	15.7	244.8	12.8	1150
1200	268.4	4.2	270.4	3.5	266.3	3.4	241.4	2.6	251.9	16.9	248.1	14.7	245.0	15.4			1200
1250	290.1	3.5	283.6	2.9	276.3	3.2	253.0	2.5	252.4	16.8	249.5	14.5	246.1	14.8			1250
1300	269.1	4.8	288.1	3.1	285.5	2.8			251.9	16.2	250.4	14.1	246.3	14.3			1300
1350	264.7	5.3	316.3	2.8	294.4	2.5			251.5	16.2							1350
1400			321.0	2.5	298.9	2.2			251.4	16.7							1400
1450			324.2	3.0	309.3	2.0											1450
1500					324.6	1.9											1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-5 6 Nov 71 0930 EST Combined		Ascn C-6 6 Nov 71 1000 EST Combined		Ascn C-7 6 Nov 71 1030 EST Double		Ascn C-8 6 Nov 71 1100 EST Combined		Ascn C-9 6 Nov 71 1130 EST Combined		Ascn C-10 6 Nov 71 1200 EST Combined		Ascn C-1 9 Nov 71 0730 EST Double		Ascn C-2 9 Nov 71 0800 EST Combined		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0		0.0		0.0		0.0	225.0	1.8		0.0		0.0	Sfc
50	068.8	1.8	068.6	0.8	115.0	0.6	145.1	0.1	279.5	1.0	222.9	5.2	186.8	0.6	306.7	1.3	50
100	072.3	2.1	078.5	1.2	200.1	1.7	205.0	1.4	236.9	2.5	219.7	8.3	186.8	1.2	278.5	1.3	100
150	114.0	1.4	194.7	1.7	209.6	3.4	213.6	4.0	227.4	4.2	218.6	10.8	175.3	2.7	249.6	0.9	150
200	169.5	1.6	209.5	4.3	212.8	5.1	215.0	5.9	224.9	5.6	221.2	7.7	170.9	4.4	158.5	0.8	200
250	200.3	2.7	212.7	7.0	215.1	6.8	215.5	7.3	224.5	6.7	224.4	6.5	168.9	6.2	154.7	2.4	250
300	211.5	4.2	214.0	9.5	217.3	8.6	216.5	8.8	224.2	7.7	225.0	7.8	167.6	7.5	155.9	4.2	300
350	215.0	6.3	214.8	10.7	218.8	10.4	219.8	9.9	222.9	9.0	225.7	8.8	165.4	6.8	157.3	5.3	350
400	216.7	8.5	215.5	11.6	220.1	12.1	221.8	11.5	221.2	10.5	226.8	9.3	163.8	6.6	158.7	6.2	400
450	218.2	10.8	218.0	13.4	223.2	13.6	224.6	12.7	221.2	10.8	227.2	9.9	165.3	8.0	160.7	6.8	450
500	219.2	13.2	220.9	17.4	229.9	12.1	231.6	12.3	220.9	10.6	225.2	11.4	168.1	9.0	163.9	7.1	500
550	223.3	13.6	229.4	12.1	236.1	13.0	235.9	10.5	222.4	11.9	224.4	12.1	171.7	9.7	166.9	7.4	550
600	228.2	13.4	232.6	15.1	243.5	11.7	238.2	12.3	228.6	12.4	226.4	10.7	180.1	9.4	173.0	8.2	600
650	232.8	14.7	245.4	9.5	258.1	6.0	239.7	13.2	232.0	14.2	233.6	10.1	188.9	8.9	178.3	9.1	650
700	243.2	11.4	245.5	8.3	247.6	6.1	241.2	12.7	232.3	16.1	234.2	10.1	198.8	8.3	185.7	9.6	700
750	244.0	14.7	300.6	2.7	236.8	7.1	239.8	12.7	232.7	16.8	243.9	6.8	204.5	9.0	193.8	10.1	750
800	244.2	14.2	244.3	9.0	235.2	6.7	236.9	13.4	235.2	16.6	239.4	12.2	211.2	8.5	199.8	9.8	800
850	243.5	13.6	240.1	11.0	238.0	9.2	234.5	13.8	236.4	16.3	238.1	12.2	221.7	7.3	205.9	9.3	850
900	242.1	13.6	240.5	11.7	237.4	8.3	232.7	13.5	236.4	16.1	236.0	12.4	234.3	7.0	212.5	9.5	900
950	242.3	13.5	240.1	12.0	235.5	9.7	233.8	14.2	234.4	16.0	234.6	12.8	235.5	8.9	218.6	10.1	950
1000	242.9	13.2	240.7	12.5			234.3	13.4	233.9	16.6	234.2	13.2	231.9	10.6	224.0	10.5	1000
1050	242.0	13.4	241.3	12.9			236.6	13.7	233.3	16.9	233.6	13.7	242.9	9.2	229.0	11.0	1050
1100	241.1	13.1					236.5	13.0	232.4	16.6	231.9	13.5	255.0	8.2	233.7	11.6	1100
1150	242.9	11.4					235.7	12.3	233.7	15.9	229.7	13.4	244.3	10.4	238.1	12.2	1150
1200	242.9	12.7							234.3	16.7	228.8	14.9	245.9	12.6	241.2	12.7	1200
1250	240.2	13.3							234.3	17.8	227.7	15.6	246.8	10.5	243.4	13.0	1250
1300	237.6	13.5							234.2	15.3	225.8	15.5	247.9	4.6	243.9	13.0	1300
1350									234.3	14.8	223.2	14.9	233.3	6.8	243.2	12.9	1350
1400									234.5	15.0			228.9	10.2	241.4	12.7	1400
1450															238.6	12.3	1450
1500															235.1	12.0	1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-3 9 Nov 71 0830 EST Double		Ascn C-4 9 Nov 71 0900 EST Double		Ascn C-5 9 Nov 71 0930 EST Single		Ascn C-6 9 Nov 71 1000 EST Double		Ascn C-7 9 Nov 71 1030 EST Double		Ascn C-8 9 Nov 71 1100 EST Double		Ascn C-9 9 Nov 71 1130 EST Double		Ascn C-10 9 Nov 71 1200 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0	270.0	0.9	225.0	2.2	202.0	1.3	180.0	3.1	202.0	3.6	202.0	3.1	225.0	4.5	Sfc
50	127.4	0.2	230.9	0.9	211.4	3.0	214.1	1.6	164.8	3.7	215.0	3.6	183.6	3.8	242.4	5.8	50
100	220.8	0.9	220.7	1.2	201.6	2.8	200.6	1.4	168.5	3.7	222.8	3.5	187.8	3.8	242.6	5.4	100
150	228.3	1.8	188.5	1.6	190.5	2.5	172.4	1.2	178.6	3.6	229.3	3.3	208.5	3.8	237.1	4.9	150
200	209.5	2.5	164.0	2.9	179.9	2.5	159.3	1.5	187.4	3.5	236.1	3.2	215.9	3.9	232.2	4.5	200
250	198.2	3.3	172.9	3.6	172.8	2.6	174.3	2.3	186.9	3.0	241.2	3.1	204.7	4.1	232.5	3.9	250
300	185.3	3.7	167.0	4.5	169.0	2.9	181.4	3.2	186.2	2.5	246.4	3.1	196.3	4.2	236.9	3.7	300
350	171.9	4.1	156.2	5.2	178.8	3.6	186.0	4.0	197.8	2.5	234.2	2.8	195.5	4.1	243.9	3.6	350
400	170.5	5.8	154.2	5.4	185.2	4.4	189.4	4.7	201.8	3.1	217.1	2.6	194.6	4.0	248.1	3.2	400
450	173.3	7.4	161.3	5.1	190.2	4.6	193.7	4.7	199.8	4.1	207.3	2.9	201.8	3.9	247.8	3.1	450
500	178.3	8.7	169.2	4.9	194.8	4.9	197.3	4.7	203.2	5.0	210.1	3.4	213.0	3.9	246.7	3.8	500
550	183.1	8.8	180.6	5.6	198.7	5.5	195.6	5.5	205.5	5.9	212.1	4.0	218.5	3.7	245.6	3.9	550
600	188.1	8.6	189.5	6.8	201.6	6.5	197.2	6.0	208.4	6.5	218.4	4.8	222.5	3.2	243.9	3.5	600
650	189.4	7.9	195.8	7.6	207.4	7.3	209.9	6.5	212.1	6.8	223.6	5.5	232.3	3.3	240.8	3.3	650
700	204.6	7.6	201.5	8.0	216.9	8.1	224.6	7.4	217.2	7.2	222.6	5.3	239.2	3.5	236.2	3.7	700
750	206.9	8.8	209.0	7.8	223.1	9.0	233.6	7.6	226.3	8.0	224.5	5.1	237.1	3.6	232.4	4.1	750
800	210.4	8.2	220.1	7.6	224.8	9.8	236.0	7.9	231.2	6.9	232.3	4.9	236.6	3.6	226.4	4.3	800
850	228.6	5.9	228.0	7.6	226.3	10.5	236.2	8.0	233.9	6.8	236.9	5.4	240.5	3.5	220.0	4.4	850
900	227.3	8.4	230.7	7.8	227.9	11.0	237.1	7.5	238.8	6.5	236.4	6.5	245.8	3.6	218.3	4.6	900
950	228.8	9.8	235.1	8.3	229.4	11.5	243.0	6.8	245.3	6.0	237.7	6.4	253.1	4.6	218.8	4.6	950
1000	258.8	6.8	241.0	7.4	232.0	11.5	244.8	6.2	242.2	5.8	239.1	6.2	250.8	5.8	226.4	3.9	1000
1050	240.4	9.7	249.0	7.9	234.5	11.6	232.0	7.2	239.0	5.9	238.1	7.3	247.1	7.3	235.8	5.7	1050
1100	248.4	6.8	249.3	7.7	238.2	11.5	221.9	6.9	232.0	8.6	236.0	8.1	244.1	9.0	239.7	6.9	1100
1150	233.9	7.4	235.7	8.0	241.9	11.5	231.6	3.4	228.0	8.9	232.3	8.1	236.3	8.6	239.3	7.1	1150
1200	230.1	5.8	228.3	8.7	240.8	11.2	246.4	5.6	226.7	7.8	233.4	6.4	232.0	7.6	236.6	9.5	1200
1250	238.6	6.0	222.4	8.1	239.5	10.9	246.9	7.3	232.0	6.5	244.5	6.1	234.6	6.3	237.1	8.4	1250
1300	252.6	6.4	218.0	6.3	235.2	11.4			243.1	6.2	244.8	7.7	246.1	5.2	244.6	8.9	1300
1350			226.2	6.1	231.2	11.9			253.4	5.8	244.4	8.7	248.6	7.0	251.3	9.6	1350
1400					229.1	12.0			245.1	6.7	249.2	9.2	249.8	8.2			1400
1450					227.0	12.1					257.4	9.6	258.2	6.9			1450
1500					224.9	11.6					257.4	10.5	262.3	8.8			1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-1 12 Nov 71 0730 EST Double		Ascn C-2 12 Nov 71 0800 EST Combined		Ascn C-3 12 Nov 71 0830 EST Combined		Ascn C-4 12 Nov 71 0900 EST Combined		Ascn C-5 12 Nov 71 0930 EST Combined		Ascn C-6 12 Nov 71 1000 EST Combined		Ascn C-7 12 Nov 71 1030 EST Double		Ascn C-8 12 Nov 71 1100 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0		0.0	225.0	2.2	270.0	4.5	202.0	3.1	225.0	7.2	225.0	5.4	Sfc
50	230.4	2.4	231.0	2.9	232.9	4.0	223.6	5.4	248.3	4.3	230.0	5.8	227.6	8.1	228.2	8.7	50
100	223.2	4.8	226.4	5.2	223.1	5.6	221.0	5.5	245.3	5.7	236.5	7.5	232.1	8.5	229.9	9.5	100
150	228.6	6.2	228.4	6.5	221.2	7.1	218.0	5.3	245.0	7.2	238.7	9.1	237.0	8.8	231.4	10.0	150
200	232.8	7.6	231.6	7.5	228.2	8.3	220.4	5.9	245.4	8.3	241.5	9.7	241.8	9.0	233.2	9.6	200
250	235.3	9.2	235.1	8.8	232.7	9.4	226.2	7.4	246.2	9.0	244.2	10.2	247.3	8.8	236.1	10.1	250
300	237.2	8.8	237.8	10.0	234.6	10.1	230.0	9.0	247.1	9.5	247.3	11.0	253.0	8.7	239.1	10.6	300
350	241.4	8.8	240.3	9.9	236.0	10.6	232.6	10.6	248.1	9.6	248.0	11.6	254.9	9.3	242.6	9.6	350
400	246.8	9.4	245.5	10.2	239.0	10.8	239.6	10.4	250.8	10.0	248.5	11.9	254.5	10.3	246.6	9.3	400
450	252.4	10.4	250.7	10.6	245.0	10.9	247.8	10.0	254.5	10.5	254.6	12.8	254.2	11.4	250.1	9.7	450
500	257.9	11.7	253.6	11.1	249.0	11.8	256.2	10.0	258.5	11.9	253.6	12.4	248.0	11.1	257.3	9.2	500
550	262.6	13.2	258.8	11.9	252.7	12.7	255.4	12.1	259.6	13.0	258.5	12.0	241.6	11.0	260.8	9.6	550
600	267.5	12.0	263.8	12.6	257.0	13.5	257.0	13.9	259.7	14.1	261.4	14.8	245.8	11.1	254.0	12.4	600
650	267.7	12.0	268.4	13.2	260.9	14.0	259.1	15.6	261.7	13.7	263.1	13.5	250.6	11.5	260.0	13.8	650
700	266.6	13.4	269.7	13.1	264.7	13.9	261.6	17.4	263.9	13.4	266.6	12.0	254.3	12.4	262.8	18.2	700
750	267.6	15.6	270.4	14.2	265.3	15.2	262.6	18.7	264.3	16.2	262.9	16.6	258.8	14.0	265.5	13.1	750
800	283.0	9.4	271.6	14.9	264.5	17.1	262.4	19.4	265.6	16.5	261.2	19.7	264.0	15.8	263.0	17.6	800
850	274.6	16.0	273.5	14.9	265.7	17.3	262.9	19.7	271.4	11.1	260.9	18.9	262.2	15.3	262.5	18.2	850
900	278.7	14.9	277.0	15.1	267.7	17.4	264.0	19.7	268.7	16.1	260.9	17.6	259.1	16.7	263.4	14.8	900
950	280.2	15.5	279.1	15.5	271.2	17.3	265.5	19.5	269.0	17.5	263.4	13.7	257.6	18.5	263.7	15.4	950
1000	280.5	16.2	280.0	16.1	271.3	17.2	267.2	19.2	269.6	18.3	267.1	11.6	258.8	15.6	264.1	17.3	1000
1050	285.6	12.5	278.8	16.5	269.6	16.9	266.4	19.9	268.3	20.0	270.2	12.6	264.8	12.8	265.2	19.8	1050
1100	288.8	9.4	279.0	16.5	268.2	17.4	264.4	21.3	267.2	21.5	265.5	14.8	265.2	19.1	268.0	18.6	1100
1150	275.9	14.3	279.3	16.4	267.0	17.9	263.2	21.5	265.9	22.9	266.4	15.8	269.0	17.1	273.6	14.9	1150
1200	272.4	19.2	274.6	17.8	266.1	18.5	262.3	21.1	265.5	23.7	274.5	15.3	275.0	14.5	288.4	9.5	1200
1250	271.7	19.0	273.1	18.9	265.3	19.8	262.5	21.7	265.5	24.3	278.1	17.3	285.5	11.7	285.5	13.2	1250
1300			273.1	19.6	264.4	21.6	262.9	22.6	267.5	27.0	280.3	18.5	283.1	15.5			1300
1350					265.1	24.0	263.0	22.7	269.0	29.4	281.7	19.4	282.7	17.4			1350
1400					266.4	25.6					281.6	23.8	283.3	17.5			1400
1450					270.3	24.6					281.6	25.4					1450
1500					273.4	23.9											1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn C-9 12 Nov 71 1130 EST Combined		Ascn C-1 13 Nov 71 0730 EST Double		Ascn C-2 13 Nov 71 0800 EST Double		Ascn C-3 13 Nov 71 0830 EST Double		Ascn C-4 13 Nov 71 0900 EST Double		Ascn C-5 13 Nov 71 0930 EST Double		Ascn C-6 13 Nov 71 1000 EST Double		Ascn C-7 13 Nov 71 1030 EST Combined		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	202.0	8.0		0.0	270.0	0.9	270.0	2.2	315.0	3.6	315.0	0.9	315.0	1.5	315.0	3.1	Sfc
50	219.1	7.9	265.4	2.2	258.4	3.2	282.4	5.0	288.6	6.0	278.9	2.9	286.4	5.7	306.2	5.4	50
100	229.1	7.9	274.1	3.0	249.5	3.9	282.5	5.9	280.1	6.1	270.3	3.9	282.5	6.2	296.8	6.1	100
150	235.0	8.2	276.9	3.8	253.0	4.1	277.7	6.1	276.2	6.5	267.0	4.6	280.3	4.5	291.0	5.4	150
200	240.5	8.5	275.9	4.7	250.2	4.1	272.0	6.3	273.9	6.5	267.1	5.2	272.1	5.4	284.6	4.8	200
250	243.1	8.6	272.5	5.6	245.1	4.1	268.3	6.1	272.4	6.2	274.7	5.0	271.6	6.4	279.9	5.0	250
300	244.9	8.7	268.6	6.0	249.1	5.3	268.2	6.5	272.7	6.5	282.4	5.0	270.1	6.5	274.2	4.6	300
350	245.4	8.7	273.7	6.4	248.0	5.5	268.8	7.4	272.6	6.7	286.8	5.9	271.6	6.4	268.6	4.4	350
400	245.5	8.8	282.2	7.2	245.6	5.1	262.1	6.9	271.5	6.7	288.9	7.2	272.8	6.7	265.4	4.7	400
450	246.4	9.0	286.7	6.8	258.1	4.6	257.7	6.8	269.4	7.1	289.4	7.2	272.8	7.3	266.2	6.2	450
500	247.4	9.3	272.4	7.7	268.4	4.3	258.8	7.2	266.7	8.0	289.5	6.9	272.7	7.3	268.4	6.9	500
550	253.4	9.9	273.7	7.5	275.0	4.1	259.8	7.7	268.3	8.5	286.4	7.2	272.8	7.4	268.5	7.2	550
600	255.1	10.2	275.0	9.1	273.0	4.2	260.8	8.1	270.2	8.9	283.5	7.7	273.3	7.5	268.0	7.2	600
650	252.1	10.4	276.8	9.0	269.7	5.0	261.7	8.6	269.7	9.5	281.2	8.8	274.4	7.6	269.4	7.3	650
700	257.1	12.8	278.7	7.4	271.8	6.0	262.6	9.2	269.1	9.9	279.5	10.0	275.7	7.7	270.2	7.3	700
750	259.5	16.4	278.6	5.8	267.4	6.4	263.4	9.8	267.9	9.9	276.9	10.2	276.7	8.3	271.2	7.3	750
800	265.1	18.7	274.6	7.4	260.2	7.2	265.4	10.1	269.1	10.0	274.4	10.4	277.6	8.9	280.6	6.5	800
850	261.7	19.8	273.7	8.7	259.3	7.4	272.3	9.5	273.5	10.1	274.8	10.1	279.3	9.5	290.0	6.3	850
900	256.1	20.8	269.1	9.0	262.0	8.5	271.4	10.8	276.2	10.3	276.6	9.9	280.9	10.1	293.1	7.0	900
950	260.2	23.9			262.2	9.4	269.4	12.2	277.0	10.5	281.4	9.7	284.1	9.5	297.3	7.2	950
1000	262.5	24.4			261.0	10.9	268.3	12.4	276.5	10.5	281.5	10.4	289.4	8.1	299.5	7.4	1000
1050	263.9	22.8			261.8	12.0	269.4	13.0	274.8	10.3	280.0	11.2	288.9	8.8	297.1	8.0	1050
1100	263.1	24.5			266.2	11.6	271.3	13.8	274.4	10.3	277.8	11.8	285.9	10.5			1100
1150	264.4	24.2			268.2	13.5	273.0	12.8			276.2	12.3	285.3	10.9			1150
1200	268.7	21.7			268.9	14.4	275.4	12.1									1200
1250	272.0	19.3					278.6	11.8									1250
1300	275.5	18.0					278.2	12.9									1300
1350	278.5	18.4					279.1	13.6									1350
1400	285.6	17.9					284.0	12.6									1400
1450	292.2	17.9					286.3	13.3									1450
1500	291.3	19.8					287.0	14.2									1500

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn K-1 16 Nov 71 0730 EST Double		Ascn K-2 16 Nov 71 0800 EST Double		Ascn K-3 16 Nov 71 0830 EST Double		Ascn K-4 16 Nov 71 0900 EST Double		Ascn K-5 16 Nov 71 0930 EST Double		Ascn K-6 16 Nov 71 1000 EST Double		Ascn K-7 16 Nov 71 1030 EST Double		Ascn K-8 16 Nov 71 1100 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc		0.0		0.0		0.0	292.0	0.4		0.0		0.0	337.0	1.3	360.0	1.8	Sfc
50	270.8	1.6	299.7	1.6	036.5	0.7	290.2	2.8	323.5	2.8	296.4	1.3	321.9	2.0	320.1	3.4	50
100	283.0	3.1	299.4	2.8	335.9	2.3	304.8	3.2	319.6	3.8	290.9	1.6	314.9	2.1	317.7	3.2	100
150	296.7	4.4	313.5	4.7	327.4	4.2	316.0	4.1	318.6	4.5	303.4	2.2	323.3	2.6	323.3	3.5	150
200	312.3	5.6	325.4	6.8	328.8	5.6	318.4	6.6	324.9	5.4	315.3	3.1	336.6	3.9	331.6	3.7	200
250	330.0	6.1	335.3	7.3	334.8	6.2	323.5	7.2	332.3	6.1	329.7	5.0	342.7	4.6	342.5	4.0	250
300	339.3	6.7	341.2	8.5	339.6	6.9	329.0	7.4	339.7	6.6	337.1	6.1	347.2	5.2	354.9	4.5	300
350	345.1	7.3	346.9	7.9	349.5	7.3	334.8	7.7	346.2	6.9	342.8	6.6	350.9	5.9	356.5	4.5	350
400	349.9	7.9	350.2	8.0	352.1	7.8	341.2	8.0	350.4	7.3	346.7	7.1	353.8	6.7	357.6	6.8	400
450	354.9	8.5	352.2	8.6	353.4	8.2	348.6	7.7	353.3	6.9	350.2	7.5	357.0	7.0	003.3	6.6	450
500	358.8	8.6	355.3	8.8	355.8	8.4	349.2	7.9	351.7	8.4	355.2	7.6	003.7	6.1	009.9	7.1	500
550	001.1	8.7	356.4	9.7	358.0	8.7	350.5	7.8	352.4	8.0	357.0	7.7	010.9	5.5	011.0	7.9	550
600	001.3	8.9	357.2	9.7	357.8	9.5	351.6	8.2	350.4	7.0	358.1	8.1	005.8	7.4	008.4	7.9	600
650	001.3	8.9	357.3	9.9	358.0	9.6	355.2	8.4	350.1	8.2	358.7	8.3	001.9	7.9	005.0	7.8	650
700	359.8	9.4	356.9	10.3	358.5	9.8	000.3	8.4	350.6	8.4	358.9	8.0	001.6	6.8	002.9	8.3	700
750	359.6	9.3	357.4	10.9	359.4	10.8	001.3	9.0	352.3	7.8	358.2	7.3	001.6	7.6	003.1	8.1	750
800	360.0	9.0	356.6	11.2	359.4	11.6	001.1	9.6	356.5	7.2	356.9	7.4	359.2	7.9	001.5	7.6	800
850	357.6	10.8	356.9	10.9	358.9	12.3	359.4	11.8	358.9	7.4	355.7	8.0	357.0	7.7	000.6	7.9	850
900	357.2	10.3	359.2	9.7	358.6	11.9	359.4	12.5	359.3	8.7	355.8	7.5	356.3	8.0	001.8	8.2	900
950	357.6	9.0	356.5	14.3	358.6	10.1	001.4	11.0	000.4	8.3	353.8	7.4	356.9	9.0	003.9	7.3	950
1000			355.5	17.4			007.9	8.3	359.6	9.3	353.1	8.0	359.5	7.7	003.7	7.4	1000
1050									358.9	10.7	356.0	8.6	001.7	6.8	003.1	8.8	1050
1100									359.0	11.9	357.5	7.8					1100
1150									359.0	12.4							1150

Table 9. (continued) PILOT BALLOON MEASUREMENTS

	Ascn K-9 16 Nov 71 1130 EST Double		Ascn K-10 16 Nov 71 1200 EST Double		Ascn C-1 17 Nov 71 1030 EST Double		Ascn C-2 17 Nov 71 1100 EST Double		Ascn C-3 17 Nov 71 1130 EST Double		Ascn C-4 17 Nov 71 1200 EST Combined		Ascn C-5 17 Nov 71 1230 EST Double		Ascn C-6 17 Nov 71 1300 EST Double		
Z, m	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	D,deg	S,mps	Z, m
Sfc	315.0	0.9	315.0	1.3		0.0		0.0		0.0		0.0		0.0		0.0	Sfc
50	322.6	3.3	321.6	2.4	245.8	0.8	298.2	0.9	127.0	0.8	260.5	0.5	167.5	0.6	322.7	0.5	50
100	324.5	4.4	324.8	2.7	193.9	0.2	296.9	1.1	128.4	0.9	218.3	0.1	281.7	0.8	301.6	0.1	100
150	312.1	3.9	323.8	2.9	118.7	0.2	319.4	1.2	129.7	1.0	106.2	0.5	318.9	0.6	116.0	0.2	150
200	307.3	3.5	314.1	2.9	104.0	0.1	324.5	1.6	127.6	0.6	104.8	0.9	014.0	0.6	069.9	0.6	200
250	315.8	2.9	317.6	2.3	280.1	0.1	317.6	1.5	141.0	0.4	140.6	0.7	070.9	0.5	095.7	0.7	250
300	331.7	3.3	324.9	3.0	133.2	0.4	261.8	0.7	170.0	0.5	182.6	0.8	156.7	0.6	128.0	0.8	300
350	334.6	3.4	325.2	3.1	162.8	2.6	205.8	2.8	172.0	1.3	199.4	1.2	192.7	1.3	147.0	0.9	350
400	343.0	3.7	328.9	3.2	172.5	3.6	203.5	3.6	182.9	1.5	197.9	1.8	222.2	1.6	162.3	1.0	400
450	356.3	4.1	339.2	4.4	186.5	3.7	206.2	3.8	196.8	1.6	208.1	2.5	246.9	2.0	183.3	0.9	450
500	008.4	4.8	344.2	4.7	204.3	3.6	210.0	4.1	196.9	2.6	219.6	3.4	243.4	2.2	195.8	0.8	500
550	017.4	5.5	347.7	4.5	206.9	4.1	207.8	4.1	196.4	3.5	217.6	3.8	240.7	2.0	200.5	0.6	550
600	023.1	5.7	350.6	3.8	199.4	3.6	207.5	4.2	194.7	4.2	213.4	4.0	237.8	1.7	242.2	2.6	600
650	028.3	5.7	001.2	3.6	184.9	2.7	208.2	4.5	194.6	4.4	212.1	3.8	229.5	3.0	231.9	3.4	650
700	013.6	6.2	017.2	2.8	166.5	2.2	202.8	4.3	197.4	4.0	211.9	3.8	225.0	4.2	222.2	3.9	700
750	007.6	6.6			150.6	2.3	190.5	3.5	195.9	3.5	208.8	3.7	218.0	4.1	221.3	4.3	750
800	012.1	6.5			138.7	2.8	163.7	2.6	187.2	3.2	198.4	3.7	214.2	3.8	226.4	4.4	800
850	010.8	6.8			113.7	2.0	162.4	2.8	180.9	2.8	190.1	3.2	211.2	3.6	220.1	3.9	850
900	010.5	6.9			248.9	4.4	143.2	1.3	175.5	2.1	188.1	2.5	210.7	3.8	225.3	3.1	900
950	012.9	7.0			264.9	5.1	039.0	0.7	172.3	0.5	204.3	1.6	219.0	2.6	244.4	2.3	950
1000	015.6	6.5			357.0	2.6	357.7	1.5	340.4	0.4	258.0	1.2	258.0	1.7	280.9	2.0	1000
1050							342.8	2.0	333.7	1.4	292.1	1.9	299.9	2.7	296.4	2.3	1050
1100							330.2	3.2	327.8	2.6	298.9	2.8	304.6	3.3	282.5	2.9	1100
1150							321.0	3.9	322.0	3.4	305.4	3.2	312.5	3.2	274.3	3.4	1150
1200							316.6	4.3	311.9	3.6	304.6	3.5	295.6	3.6	271.0	3.4	1200
1250									270.9	7.2	293.0	4.0	283.7	4.0	265.4	3.5	1250
1300									262.6	9.7	288.4	4.0	278.5	3.9	262.2	3.5	1300
1350									285.5	4.0	285.5	3.8	273.3	4.1	260.3	3.4	1350
1400									302.6	2.9	284.7	3.6					1400
1450									308.5	2.4	284.4	3.5					1450
1500											284.4	3.3					1500

RADIOSONDE MEASUREMENTS

Radiosonde observations taken at Jimmy Stewart Airport are presented in Table 10. On most experiment days, two releases were effected, one prior to and another following the airborne activities. In addition, a single early-morning radiosonde was occasionally released on days during which the weather proved too restrictive for flying; these observations are also included in this table.

The pressure, temperature, dewpoint, and height above MSL of each mandatory and significant level up to and including 700 millibars are given for each radiosonde observation in Table 10. The accompanying rabal wind speeds and directions are listed for fixed heights, i.e., surface, 150 and 300 meters above surface, and 500, 1000, 1500, 2000, 2500, and 3000 meters MSL. Elevation of the release site is 428 meters MSL.

Table 10. RADIOSONDE MEASUREMENTS

Legend

Ascn : Individual ascension or radiosonde designation.
EST : Release time of radiosonde.
P, mb : Mandatory and significant pressure levels in whole millibars.
Z, m : Height of each level above mean sea level in whole meters.
T, °C : Dry-bulb temperature in degrees Centigrade to nearest tenth.
Td, °C : Dewpoint temperature in degrees Centigrade to nearest tenth.
H, m : Surface and 150 and 300 meters above surface in whole meters. Remaining heights above mean sea level in whole meters.
D, deg : Wind direction in whole degrees of azimuth.
S, mps : Wind speed in meters per second to nearest tenth.
Sfc : Surface wind direction and speed from Aerovane.

Table 10. RADIOSONDE MEASUREMENTS

Ascn 296 21 April 1971 0554 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	21					
952	428	8.0	5.5	Sfc	220	1.8
950	445	8.6	5.2	150	248	6.6
930	622	13.5	0.8	300	259	9.7
900	898	11.5	1.4			
886	1028	10.6	1.1	500	238	4.2
850	1373	8.8	1.7	1000	283	10.5
831	1560	7.9	1.7	1500	305	11.5
800	1873	4.9	1.7	2000	309	12.5
793	1944	4.4	1.9			
750	2397	1.7	0.6			
729	2626	0.2	0.0			
700	2951	- 2.4	- 2.6			

Ascn 297 21 April 1971 1415 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	1					
950	428	10.5	4.4	Sfc	280	6.3
900	874	5.4	- 0.2	150	283	6.6
885	1011	4.0	- 1.5	300	278	8.9
862	1226	5.0	- 6.2			
850	1340	5.1	- 7.0	500	283	4.7
834	1495	5.1	- 8.4	1000	274	10.3
822	1614	5.1	4.2	1500	290	15.6
800	1835	4.1	3.0			
757	2284	2.2	1.0			
750	2359	1.6	0.0			
700	2912	- 2.4	- 7.5			

Ascn 298 22 April 1971 0543 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	22					
952	428	1.5	1.5	Sfc	270	3.6
950	444	1.3	1.3	150	277	6.1
915	745	- 1.6	- 2.7			
900	877	- 2.1	- 2.8			
879	1064	- 2.9	- 2.9			
850	1330	- 3.9	- 3.9			
831	1509	- 4.4	- 4.4			
819	1623	- 5.0	- 7.4			
800	1807	- 6.3	- 9.2			
784	1965	- 7.2	- 9.6			
750	2310	- 9.2	-10.5			
718	2647	-11.0	-11.3			
700	2842	-11.1	-16.6			

Ascn 299 22 April 1971 1115 EST

P,mb	Z, m	T,°c	Td,°C	H, m	D,deg	S,mps
1000	46					
954	428	5.5	4.3	Sfc	270	8.9
950	462	5.1	4.0	150	292	8.7
900	900	0.6	- 0.1	300	292	9.8
884	1044	- 0.9	- 1.4			
850	1357	- 2.1	- 4.6	500	289	8.2
800	1837	- 4.2	-10.2			
791	1926	- 4.5	-11.1			
750	2344	- 7.0	-14.5			
735	2501	- 7.8	-15.5			
700	2879	-10.5	-17.2			

Ascn 300 23 April 1971 0532 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	63					
956	428	- 2.5	- 3.0	Sfc	250	1.0
950	478	- 1.4	- 3.4	150	282	4.4
930	648	2.4	- 6.7	300	298	8.6
900	913	1.1	- 8.7			
888	1021	0.7	- 9.3	500	256	2.2
850	1370	- 2.3	- 8.4	1000	309	10.8
833	1530	- 3.5	- 7.8	1500	272	13.5
808	1771	- 4.9	-11.7	2000	285	17.0
800	1849	- 5.3	-11.8	2500	293	19.7
750	2353	- 9.0	-14.2			
745	2404	- 9.3	-14.3			
700	2884	-12.3	-18.1			

Ascn 301 23 April 1971 1422 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	11					
951	428	13.5	- 2.0	Sfc	290	7.2
950	436	13.1	- 2.4	150	325	3.2
900	886	7.7	- 6.8	300	302	5.4
882	1052	5.7	- 8.5			
850	1353	2.8	-10.1	500	005	3.0
800	1839	- 1.9	-12.5	1000	296	9.3
796	1879	- 2.2	-12.5	1500	272	6.9
750	2349	- 6.3	-16.0	2000	272	8.4
747	2380	- 6.5	-16.0	2500	283	12.3
724	2625	- 5.0	-24.5			
700	2890	- 6.3	-26.2			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 302 24 April 1971 0526 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	-26					
946	428	3.5	- 0.8	Sfc	230	1.8
918	673	7.4	- 2.8	150	216	10.3
900	836	5.5	- 4.9	300	225	14.0
851	1292	4.0	- 6.5			
850	1302	3.9	- 6.6	500	210	5.7
804	1751	- 0.3	- 7.3	1000	234	21.1
800	1791	- 0.7	- 7.5	1500	245	19.4
777	2023	- 2.2	- 7.9	2000	257	16.4
750	2304	- 3.8	-11.7	2500	276	15.2
749	2314	- 3.9	-11.8			
723	2592	- 6.3	-10.5			
700	2844	- 8.8	-11.9			

Ascn 303 26 April 1971 0536 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	67					
957	428	4.0	4.0	Sfc	220	1.8
950	487	4.2	3.0	150	247	7.1
937	600	4.7	1.2	300	264	10.0
900	927	2.8	- 0.6			
894	981	2.6	- 0.8	500	237	4.8
850	1387	- 0.9	- 1.6	1000	283	9.4
839	1491	- 1.7	- 1.8	1500	290	15.2
801	1859	- 4.8	- 4.9			
800	1869	- 4.8	- 4.9			
761	2262	- 4.8	- 8.0			
750	2377	- 4.9	- 8.5			
730	2590	- 5.2	- 9.3			
700	2918	- 7.9	-13.1			

Ascn 304 26 April 1971 1345 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	86					
959	428	6.0	3.5	Sfc	270	6.3
950	505	5.1	1.9	150	306	8.7
926	713	2.6	- 2.7	300	308	10.2
900	942	0.3	- 2.9			
855	1351	- 3.6	- 3.6	500	301	8.0
850	1397	- 3.8	- 3.9	1000	313	11.1
800	1875	- 5.6	- 6.3			
783	2044	- 6.3	- 7.2			
755	2327	- 9.0	-14.4			
750	2379	- 9.3	-14.7			
722	2673	-10.6	-15.9			
700	2911	-11.1	-17.0			

Ascn 305 29 April 1971 0508 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	52					
955	428	5.0	4.5	Sfc	230	5.4
950	470	4.6	4.0	150	264	9.5
900	909	1.0	- 0.1	300	268	16.9
886	1035	0.0	- 1.2			
859	1282	- 1.6	- 5.6	500	260	6.2
850	1366	- 2.4	- 6.0	1000	275	19.5
810	1747	- 5.4	- 7.4	1500	290	18.9
800	1844	- 6.0	- 7.8			
750	2348	- 8.5	- 8.8			
741	2442	- 9.0	- 9.0			
700	2883	- 9.0	-10.6			

Ascn 306 29 April 1971 1117 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	86					
959	428	5.5	4.6	Sfc	270	6.3
950	504	4.2	2.7	150	278	12.3
928	694	1.1	- 2.1	300	279	16.2
919	773	3.0	0.2			
900	942	1.5	- 0.5	500	282	6.7
860	1307	- 1.5	- 2.2	1000	279	13.1
850	1400	- 1.8	- 3.0			
820	1686	- 2.5	- 5.6			
803	1851	- 4.5	- 9.1			
800	1881	- 4.6	- 9.6			
765	2233	- 5.9	-13.5			
750	2387	- 7.0	-14.5			
707	2846	-10.0	-17.1			
700	2923	- 8.0	-15.7			

Ascn 307 30 April 1971 0443 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	124					
964	428	4.5	4.5	Sfc	260	2.7
950	547	3.8	3.8	150	294	6.0
900	984	1.2	1.0	300	295	7.2
869	1266	- 0.5	- 0.6			
853	1415	- 1.2	- 1.6	500	286	4.8
850	1443	- 1.6	- 2.0	1000	313	8.3
800	1923	- 4.6	- 5.5	1500	320	11.8
776	2163	- 6.0	- 7.2	2000	319	8.6
750	2429	- 8.3	- 9.0			
726	2681	-10.2	-10.2			
711	2842	- 9.5	-17.5			
700	2963	- 8.9	-17.2			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 308 1 May 1971 0434 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	139					
965	428	- 1.5	- 1.5	Sfc	100	0.4
950	554	3.8	3.8	150	011	3.3
924	779	2.9	0.8	300	331	3.4
900	992	1.8	- 4.2			
897	1019	1.7	- 4.6	500	044	2.7
850	1450	- 1.9	- 5.4	1000	303	3.5
835	1592	- 2.9	- 5.5	1500	288	7.7
819	1745	- 3.7	- 9.5	2000	288	7.4
800	1930	- 3.7	-11.9	2500	327	6.3
797	1960	- 3.7	-12.1	3000	327	10.0
750	2440	- 4.5	-15.2			
700	2933	- 5.4	-19.9			

Ascn 309 3 May 1971 0431 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	78					
958	428	3.0	3.0	Sfc	280	2.2
950	495	2.5	2.0	150	303	5.6
910	842	- 0.2	- 3.4	300	299	5.8
900	930	- 0.9	- 3.4			
857	1320	- 3.6	- 4.0	500	298	4.6
850	1384	- 4.3	- 4.5	1000	324	5.4
820	1667	- 6.6	- 6.6	1500	012	3.9
800	1860	- 5.1	-11.9			
793	1929	- 4.5	-14.4			
750	2367	- 6.7	-17.2			
745	2419	- 7.0	-17.5			
728	2599	- 7.6	-19.5			
700	2903	- 9.7	-21.1			

Ascn 310 4 May 1971 0435 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	89					
959	428	0.0	0.0	Sfc	250	2.2
950	503	- 0.5	- 0.5	150	283	5.3
917	785	- 2.1	- 2.1	300	313	10.7
900	934	- 0.8	- 4.1			
894	988	- 0.4	- 5.0	500	277	4.2
850	1390	- 2.5	- 7.0	1000	310	13.1
840	1484	- 3.0	- 7.5	1500	328	12.1
800	1869	- 5.8	- 9.5	2000	332	9.5
775	2117	- 7.6	-10.8	2500	322	15.4
750	2372	- 8.6	-17.7	3000	331	19.1
747	2403	- 8.6	-18.2			
732	2561	- 8.5	-18.6			
700	2906	-10.4	-17.9			

Ascn 311 4 May 1971 1257 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	86					
960	428	12.0	- 1.1	Sfc	270	8.9
950	515	10.5	- 2.1	150	284	11.4
915	825	5.7	- 5.9	300	287	12.3
900	960	4.5	- 6.7			
857	1356	1.5	- 8.8	500	295	20.9
850	1422	0.7	- 9.3	1000	292	16.4
811	1797	- 3.2	-11.2	1500	276	9.8
800	1905	- 4.4	-11.6	2000	279	14.0
759	2317	- 8.2	-12.5	2500	301	15.2
750	2409	- 8.1	-16.0			
740	2514	- 7.9	-20.7			
716	2771	- 6.8	-24.5			
700	2946	- 8.9	-25.4			

Ascn 312 5 May 1971 0512 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	98					
961	428	8.0	2.8	Sfc	190	1.3
950	523	8.0	1.6	150	229	8.0
928	716	8.0	- 1.5	300	256	4.8
900	968	5.9	- 3.2			
864	1301	3.8	- 5.1	500	215	7.2
850	1434	3.5	- 5.4	1000	260	11.4
846	1472	3.4	- 5.5	1500	281	16.4
810	1823	0.5	- 5.9	2000	284	17.0
800	1923	- 0.5	- 5.8			
750	2434	- 6.0	- 7.1			
742	2518	- 6.9	- 7.4			
720	2754	- 6.0	- 6.0			
700	2974	- 7.3	- 7.3			

Ascn 313 5 May 1971 1148 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	72					
959	428	19.5	5.5	Sfc	230	6.3
950	508	18.5	5.0	150	239	8.7
900	967	12.9	0.9	300	234	10.3
894	1023	12.3	0.7			
850	1444	8.6	- 1.2	500	240	7.5
814	1800	5.5	- 3.3	1000	235	10.5
800	1941	3.9	- 3.6	1500	245	13.1
768	2272	0.6	- 4.8	2000	259	15.5
750	2462	- 0.8	- 6.5	2500	260	20.7
700	3010	- 4.4	-10.6			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 314 6 May 1971 0437 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	53					
956	428	11.0	11.0	Sfc	030	0.9
950	480	10.8	10.7			
900	931	9.1	8.4			
882	1098	8.6	7.5			
850	1404	7.0	2.9			
842	1481	6.7	1.8			
818	1719	5.0	1.5			
800	1900	4.3	2.1			
784	2065	3.7	2.9			
750	2424	1.7	0.9			
748	2446	1.6	0.8			
700	2980	0.1	- 0.1			

Ascn 315 7 May 1971 0444 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	148					
966	428	3.0	3.0	Sfc	070	1.3
957	504	7.8	7.8	150	055	6.4
950	565	7.5	6.7	300	055	5.4
945	608	7.4	5.9			
932	723	9.4	- 3.8	500	055	5.4
900	1012	7.7	- 6.4	1000	047	4.4
863	1356	5.8	- 9.6	1500	360	1.5
850	1480	4.7	-10.2			
832	1654	3.4	-10.6			
800	1972	2.8	-17.4			
784	2135	2.6	-20.7			
750	2493	0.5	-22.4			
700	3043	- 2.7	-25.1			

Ascn 316 8 May 1971 0432 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	37					
954	428	11.5	11.5	Sfc	150	7.2
950	463	11.7	11.6	150	168	12.5
923	705	13.0	12.1	300	190	16.0
900	917	11.9	11.3			
869	1211	10.4	10.4	500	152	10.8
850	1395	8.8	8.8	1000	212	17.5
813	1762	5.7	5.7			
800	1894	5.0	5.0			
766	2249	3.5	3.5			
750	2420	2.6	2.6			
728	2661	1.4	1.4			
700	2976	- 1.5	- 2.4			

Ascn 317 10 May 1971 0438 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	168					
969	428	3.5	3.5	Sfc	030	0.9
959	512	7.5	5.3	150	041	6.8
950	590	7.9	5.0	300	057	8.4
935	722	8.4	4.6			
900	1037	7.0	1.9	500	033	4.9
898	1055	6.9	1.6	1000	055	11.9
850	1504	3.6	- 1.9	1500	043	12.9
800	1994	0.1	- 5.7	2000	049	16.2
790	2094	- 0.6	- 6.3	2500	026	15.3
774	2258	- 1.7	- 8.0			
762	2382	- 0.9	-12.2			
750	2509	- 1.8	-11.9			
729	2734	- 3.4	-11.6			
711	2932	- 4.7	-10.1			
700	3055	- 4.9	- 6.7			

Ascn 318 10 May 1971 1231 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	172					
970	428	19.5	6.3	Sfc	020	2.2
950	606	17.1	4.4	150	352	4.7
920	878	13.7	2.0	300	359	6.3
900	1063	11.7	0.4			
850	1537	7.0	- 2.9	500	348	3.7
812	1910	3.2	- 5.9	1000	017	5.9
800	2031	2.4	- 6.2	1500	030	5.0
787	2163	1.4	- 6.6	2000	031	10.2
750	2549	- 2.2	- 9.3	2500	045	11.1
747	2581	- 2.4	- 9.3	3000	051	13.3
700	3094	- 5.2	-13.5			

Ascn 319 11 May 1971 0431 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	185					
971	428	4.5	4.5	Sfc	080	1.3
962	505	14.4	6.5	150	132	6.4
950	611	16.3	5.3	300	143	7.9
949	620	16.4	5.1			
900	1069	13.1	1.4	500	117	4.9
883	1229	12.0	0.1	1000	159	5.5
850	1546	9.3	- 1.4	1500	156	1.5
800	2045	5.1	- 4.2	2000	211	4.2
763	2430	1.9	- 6.6	2500	266	5.8
750	2569	1.6	- 7.4	3000	216	2.6
716	2942	1.0	-10.2			
700	3124	- 1.2	-13.4			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 320 11 May 1971 1335 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	144					
968	428	23.1	5.5	Sfc	150	3.6
950	590	21.3	4.4	150	125	2.4
900	1054	16.6	0.6	300	132	2.5
850	1537	11.6	- 2.9			
848	1556	11.5	- 3.0	500	135	2.9
800	2039	6.6	- 6.0	1000	153	4.0
750	2564	1.5	- 8.8	1500	167	5.9
740	2672	0.5	- 9.5	2000	187	5.3
722	2871	3.2	-18.9	2500	222	7.2
700	3121	1.8	-18.8	3000	242	7.5

Ascn 321 12 May 1971 0428 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	87					
961	428	15.6	14.4	Sfc	195	2.2
950	525	15.2	12.7			
931	697	14.5	9.5			
900	982	12.0	9.0			
894	1038	11.6	9.0			
877	1199	11.6	11.6			
850	1461	10.2	10.2			
836	1599	9.5	9.5			
800	1964	7.0	7.0			
750	2493	3.6	3.4			
748	2515	3.5	3.3			
712	2914	1.2	- 2.3			
700	3051	0.2	0.2			

Ascn 322 13 May 1971 0425 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	70					
957	428	6.1	6.1	Sfc	030	0.9
950	488	5.6	5.1			
900	928	2.3	- 1.3			
893	991	1.9	- 1.8			
881	1100	1.9	- 7.1			
852	1374	8.8	8.8			
850	1394	8.7	8.7			
802	1874	6.8	6.8			
800	1895	6.6	6.6			
750	2422	2.6	2.6			
746	2466	2.2	2.2			
700	2979	0.5	0.5			

Ascn 323 14 May 1971 0447 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	103					
961	428	3.9	3.9	Sfc	220	3.6
950	521	4.2	4.2	150	223	7.4
947	547	4.3	4.3	300	224	10.2
930	695	4.4	0.7			
920	783	6.8	1.9	500	227	7.8
903	936	6.0	0.0	1000	293	15.4
900	964	6.2	0.0	1500	304	14.1
880	1148	7.2	- 1.9	2000	295	16.0
867	1271	7.0	- 2.7	2500	324	17.7
850	1433	6.1	- 3.0			
800	1928	3.4	- 4.3			
785	2081	2.4	- 4.8			
750	2448	- 1.3	- 5.7			
748	2469	- 1.5	- 5.9			
719	2783	- 3.3	-15.9			
711	2872	- 3.5	-15.2			
700	2996	- 1.4	-19.9			

Ascn 324 14 May 1971 1247 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	132					
965	428	15.6	6.6	Sfc	260	5.4
950	560	14.0	4.6	150	288	5.8
930	739	11.9	2.1	300	310	4.4
900	1012	9.2	0.8			
850	1482	4.4	- 1.8	500	277	6.1
834	1637	5.9	- 3.7	1000	304	4.6
800	1977	3.7	- 5.5	1500	296	6.4
750	2499	0.6	- 7.9	2000	305	12.4
746	2542	0.2	- 8.2	2500	303	19.0
724	2781	- 1.2	-18.3	3000	307	20.9
709	2948	- 0.6	-18.2			
700	3050	- 0.9	-18.9			

Ascn 325 15 May 1971 0437 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	181					
970	428	6.7	0.1	Sfc	070	0.4
950	600	10.3	1.1	150	176	4.3
936	724	13.2	1.5	300	201	5.8
920	869	12.4	2.2			
900	1053	10.5	2.8	500	133	3.4
876	1277	8.2	2.8	1000	183	3.2
850	1525	6.7	- 1.4	1500	254	5.4
808	1940	4.1	-11.1	2000	231	8.4
800	2021	5.1	-12.4			
795	2072	5.7	-12.8			
750	2548	5.0	-13.9			
748	2570	4.9	-14.0			
700	3108	1.5	-14.6			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 326 15 May 1971 1145 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	172					
970	428	21.1	15.5	Sfc	200	2.7
950	608	19.3	11.1	150	195	5.4
919	891	16.3	4.0	300	200	7.1
900	1069	14.7	3.2			
850	1549	10.5	1.0	500	193	4.0
800	2050	5.9	- 1.9	1000	213	5.2
769	2372	3.0	- 3.7	1500	202	7.8
757	2499	2.7	- 6.7	2000	194	8.6
750	2575	3.3	- 9.0	2500	230	8.5
737	2717	4.5	-15.4	3000	184	8.9
700	3135	2.5	-18.2			

Ascn 327 17 May 1971 0430 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	104					
962	428	11.7	11.7	Sfc	230	2.2
950	533	11.1	11.1	150	249	5.5
902	965	8.7	8.7			
900	983	8.8	8.8			
892	1057	9.2	9.1			
866	1302	7.6	4.4			
860	1360	8.9	4.9			
850	1457	8.1	2.7			
820	1753	6.0	5.7			
800	1955	5.5	3.3			
784	2121	5.1	1.4			
750	2481	2.0	- 0.5			
700	3034	- 2.8	- 4.0			

Ascn 328 17 May 1971 1239 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	26					
963	428	19.4	6.8	Sfc	280	4.5
950	544	18.3	5.8	150	318	6.1
900	1004	14.2	2.4	300	328	6.5
850	1483	9.9	- 1.4			
800	1983	5.4	- 5.0	500	309	6.3
767	2325	2.2	- 7.9	1000	327	10.3
750	2506	0.6	- 8.9	1500	324	10.5
733	2690	- 0.9	-10.0	2000	311	9.9
710	2946	2.8	-18.0	2500	326	9.8
700	3061	2.8	-16.8			

Ascn 329 18 May 1971 0436 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	130					
965	428	5.0	5.0	Sfc	070	1.3
954	523	18.1	6.6	150	166	2.1
950	559	16.9	5.2	300	231	1.8
900	1019	15.6	2.0			
850	1502	13.3	- 3.0	500	139	3.0
829	1712	12.3	- 5.2	1000	281	5.4
800	2010	12.1	- 9.0	1500	325	10.5
796	2052	12.0	- 9.6			
750	2547	8.4	-12.1			
700	3113	4.3	-15.0			

Ascn 330 19 May 1971 0430 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	117					
964	428	12.2	12.2	Sfc	090	0.9
955	508	22.7	16.6	150	238	2.7
950	554	23.1	16.0	300	239	4.3
937	674	24.0	13.6			
900	1025	21.6	11.1	500	189	2.1
861	1408	19.0	8.1	1000	240	6.4
850	1519	18.2	7.3	1500	232	8.1
800	2035	14.1	4.7	2000	241	10.8
770	2356	11.5	2.5	2500	196	6.9
750	2576	10.6	1.4	3000	184	9.6
747	2610	10.6	1.1			
700	3148	6.4	- 2.7			

Ascn 331 20 May 1971 0437 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	121					
965	428	14.4	14.5	Sfc	300	0.9
951	552	17.6	15.3	150	352	7.2
950	561	17.6	15.3	300	347	7.9
900	1024	17.2	12.8			
880	1216	17.0	11.7	500	351	5.0
850	1512	14.9	9.7	1000	277	4.8
826	1754	13.1	8.2	1500	243	4.6
800	2023	11.0	7.5	2000	203	7.0
774	2298	8.8	6.4	2500	205	13.4
750	2558	6.9	4.4			
700	3123	2.7	0.0			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 332 20 May 1971 1248 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	121					
965	428	23.9	14.4	Sfc	230	3.1
951	555	21.2	9.1	150	284	3.8
950	564	21.0	9.0	300	286	3.9
900	1028	16.6	6.7			
882	1200	15.1	5.9	500	270	3.7
850	1511	11.6	4.3	1000	272	6.4
835	1660	10.1	3.4	1500	269	5.2
822	1791	11.3	- 1.1			
800	2017	9.7	- 1.9			
750	2549	5.9	- 4.2			
700	3111	1.9	- 6.9			

Ascn 333 18 October 1971 0535 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	202					
976	428	9.4	9.5	Sfc	090	3.1
950	653	11.0	9.5	150	130	7.1
900	1107	13.8	8.5	300	142	11.3
886	1240	14.6	7.9			
850	1592	16.5	- 0.2	500	119	4.3
846	1632	16.6	- 0.6	1000	152	5.8
800	2107	15.1	- 1.0	1500	146	6.2
784	2278	14.6	- 1.5	2000	078	6.6
750	2652	13.0	- 2.9			
700	3229	10.2	- 6.6			

Ascn 334 18 October 1971 1201 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	216					
976	428	17.8	7.3	Sfc	100	3.1
950	658	15.6	4.4	150	094	2.1
900	1113	10.9	- 2.5	300	113	2.2
881	1290	9.0	- 5.7			
850	1589	13.2	- 6.9	500	082	2.5
800	2097	11.6	-11.3	1000	133	2.0
788	2223	11.1	-13.1	1500	143	8.8
750	2633	7.5	-12.3	2000	142	7.9
740	2743	6.7	-12.5	2500	126	6.0
700	3197	4.4	-16.7	3000	092	5.6

Ascn 335 19 October 1971 0445 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	221					
975	428	5.6	5.6	Sfc	070	1.5
951	635	13.5	0.2	150	129	8.4
950	644	13.6	0.3	300	134	11.1
921	906	17.1	- 4.2			
900	1103	17.1	- 6.0	500	119	6.0
882	1275	17.1	- 8.2	1000	143	7.7
850	1589	15.3	- 9.5	1500	148	10.3
800	2098	11.7	-11.2			
750	2634	7.6	-14.0			
700	3198	3.4	-17.5			

Ascn 336 19 October 1971 1250 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	215					
976	428	22.8	8.6	Sfc	100	2.6
950	662	20.3	5.9	150	105	3.7
900	1125	15.8	2.3	300	117	2.2
883	1286	14.1	- 1.1			
850	1608	15.0	1.5	500	107	3.5
800	2118	11.9	- 3.1	1000	110	3.4
750	2655	8.4	- 8.2	1500	104	8.4
700	3222	4.8	-14.1	2000	087	8.9
				2500	101	19.4
				3000	111	13.5

Ascn 337 20 October 1971 0445 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	257					
980	428	8.3	6.5	Sfc	060	1.5
965	556	9.4	3.0	150	127	12.1
950	686	8.5	2.5	300	131	17.9
937	799	7.6	1.9			
921	941	7.5	0.7	500	109	3.8
908	1060	14.0	- 0.4			
900	1135	13.6	3.7			
893	1200	13.1	5.8			
881	1314	14.5	- 8.2			
850	1617	15.0	- 9.9			
813	1992	13.3	-12.8			
800	2127	12.1	-13.8			
750	2663	7.5	-16.8			
700	3226	2.5	-20.2			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 338 20 October 1971 1245 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	277					
982	428	17.2	5.2	Sfc	110	3.1
950	709	14.6	4.6	150	141	5.9
900	1163	10.1	3.0	300	147	3.5
894	1219	9.5	2.4			
869	1456	13.9	-8.7	500	131	5.7
850	1642	14.9	-8.5	1000	123	2.8
842	1722	15.0	-9.2	1500	155	11.6
829	1854	13.5	0.9	2000	161	8.7
805	2101	13.9	-11.5	2500	144	6.0
800	2153	13.5	-11.1	3000	140	6.1
750	2692	8.8	-15.0			
700	3257	3.7	-18.5			

Ascn 339 21 October 1971 0440 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	261					
980	428	7.8	7.9	Sfc	070	1.0
952	668	9.4	6.5	150	132	7.1
950	686	10.0	6.4	300	175	5.1
916	993	17.4	-2.8			
900	1143	17.0	-3.7	500	107	6.0
870	1431	16.3	-6.7	1000	141	4.5
850	1628	14.9	-7.2	1500	172	5.8
817	1962	12.5	-7.5	2000	157	5.3
800	2138	11.5	-5.9	2500	166	5.7
767	2489	9.6	-5.5			
750	2674	8.4	-5.1			
700	3241	4.2	-5.9			

Ascn 340 21 October 1971 1220 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	242					
978	428	20.6	6.6	Sfc	190	2.0
950	678	18.0	4.9	150	130	1.0
900	1136	13.2	1.9	300	169	1.7
894	1193	12.8	1.8			
883	1297	15.7	-6.6	500	128	1.3
850	1619	14.0	-8.0	1000	130	2.9
800	2127	11.4	-10.2	1500	146	6.0
750	2664	8.6	-13.1	2000	136	6.0
700	3231	5.6	-16.3	2500	127	8.1
				3000	120	13.1

Ascn 341 22 October 1971 0440 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	175					
973	428	10.0	10.1	Sfc	100	1.0
965	497	12.7	11.3	150	144	8.3
950	629	12.4	10.4	300	179	7.7
900	1082	11.2	5.8			
895	1129	11.1	5.2	500	124	6.6
869	1376	14.4	-2.5	1000	182	10.6
850	1563	13.0	-4.2	1500	191	8.8
803	2037	9.4	-11.9	2000	174	4.3
800	2068	9.4	-11.9	2500	179	8.5
764	2450	9.4	-13.1	3000	217	3.2
750	2603	9.0	-13.4			
740	2114	8.5	-14.5			
700	3170	4.9	-17.5			

Ascn 342 22 October 1971 1210 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	181					
971	428	17.2	13.4	Sfc	160	4.1
964	498	16.1	9.1	150	167	3.0
950	623	15.1	9.1	300	189	4.2
900	1078	11.2	7.9			
892	1153	10.8	7.5	500	133	2.6
867	1390	10.8	4.3	1000	213	4.2
850	1556	10.8	5.6	1500	250	9.2
837	1684	9.6	9.2			
811	1946	7.5	0.3			
800	2059	8.7	4.0			
799	2069	8.7	4.0			
784	2226	7.8	5.3			
771	2364	7.0	-9.0			
760	2482	7.8	-13.8			
750	2591	7.2	-14.3			
700	3157	5.6	-15.7			

Ascn 343 23 October 1971 0445 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	146					
967	428	13.9	14.0	Sfc	020	1.2
950	578	13.6	13.7			
900	1034	12.5	12.6			
873	1261	11.9	12.0			
850	1514	10.8	10.9			
800	2019	8.5	8.6			
750	2552	6.0	6.0			
700	3116	3.4	3.4			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 344 25 October 1971 0440 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	103					
963	428	15.0	15.1	Sfc	130	1.5
950	543	14.8	14.7	150	131	7.3
900	1001	13.4	12.9	300	152	10.2
850	1483	12.0	10.7			
847	1512	11.9	10.6	500	124	5.1
800	1989	9.2	6.7	1000	191	8.0
750	2523	6.2	2.3	1500	215	9.9
739	2644	5.4	1.0	2000	181	10.5
700	3086	2.6	1.4	2500	207	11.5

Ascn 345 26 October 1971 0440 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	116					
964	428	12.2	12.3	Sfc	270	2.1
950	551	11.7	11.8			
900	1003	9.7	9.8			
884	1152	8.9	9.0			
856	1420	10.0	10.1			
850	1478	9.8	9.9			
806	1919	7.0	7.0			
800	1981	7.1	6.4			
767	2328	7.2	1.5			
750	2513	6.6	1.5			
730	2734	5.5	0.7			
700	3077	4.6	- 8.9			

Ascn 346 27 October 1971 0440 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	131					
965	428	11.7	6.7	Sfc	110	4.1
950	559	10.6	7.3			
911	907	7.7	7.8			
900	1008	11.1	5.9			
889	1111	14.0	2.6			
850	1489	13.7	- 1.1			
800	2000	13.2	- 8.1			
780	2212	13.0	-11.5			
750	2541	11.4	-10.8			
700	3114	8.6	-10.4			

Ascn 347 28 October 1971 0440 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	160					
969	428	11.1	11.2	Sfc		0.0
957	533	15.4	11.9	150	236	6.8
950	595	15.7	12.0	300	251	13.5
930	777	16.2	11.4			
900	1055	14.7	10.4	500	221	3.4
896	1093	14.4	9.9	1000	277	9.9
859	1449	12.4	5.6	1500	289	13.4
850	1537	11.8	5.5	2000	274	8.9
813	1908	8.4	3.3	2500	245	12.2
800	2041	8.7	- 2.6	3000	276	5.9
791	2135	8.8	- 9.2			
757	2499	9.5	-15.1			
750	2576	9.2	-15.4			
700	3145	7.0	-17.9			

Ascn 348 29 October 1971 0440 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	225					
976	428	7.2	7.2	Sfc	090	2.1
962	549	16.3	12.3	150	091	3.9
950	656	16.6	11.6	300	128	2.4
936	783	16.9	11.0			
900	1116	14.1	6.7	500	086	4.4
891	1201	13.3	5.5	1000	001	0.1
850	1595	10.0	5.0	1500	210	5.4
845	1644	9.4	4.6	2000	247	1.1
800	2097	6.6	- 6.1	2500	100	2.3
779	2317	11.2	-11.6	3000	017	2.5
750	2633	10.6	-12.1			
746	2677	10.5	-12.2			
700	3204	6.6	0.9			

Ascn 349 30 October 1971 0459 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	186					
972	428	18.3	13.7	Sfc		0.0
957	563	22.3	16.9	150	200	4.8
950	627	22.3	16.7	300	257	8.3
909	1011	21.9	13.9			
900	1097	21.0	13.3	500	161	4.6
850	1589	16.3	10.9	1000	243	6.4
818	1914	13.1	9.0	1500	255	8.9
800	2102	14.0	3.8	2000	262	8.6
779	2327	14.9	- 8.5	2500	256	12.1
750	2648	16.3	- 8.1	3000	252	11.2
743	2728	16.5	- 7.9			
700	3232	12.6	-10.4			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 350 1 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	180					
972	428	16.7	16.5	Sfc	330	3.1
950	623	13.5	13.0	150	020	2.9
919	903	14.5	14.6			
900	1080	13.9	14.0			
850	1562	12.0	12.1			
800	2070	10.0	10.1			
773	2356	8.9	9.0			
750	2606	7.1	5.8			
700	3172	3.6	1.0			

Ascn 351 2 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	80					
960	428	17.2	17.3	Sfc	220	3.1
950	518	17.6	17.6	150	207	8.5
911	878	18.5	17.1	300	213	15.8
900	983	18.0	16.8			
850	1471	15.1	14.2	500	209	6.3
800	1984	12.1	11.7			
750	2524	9.0	8.9			
740	2636	8.2	8.3			
700	3094	5.5	5.5			

Ascn 352 2 November 1971 1330 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	-12					
959	428	20.0	15.5	Sfc	250	5.1
950	509	19.4	15.4	150	185	7.0
900	973	15.7	13.8	300	185	15.0
883	1135	14.2	12.8			
850	1456	12.6	8.9	500	187	5.1
804	1922	9.9	2.0	1000	185	19.1
800	1963	9.7	2.3	1500	199	20.8
753	2464	6.3	1.3			
750	2497	6.2	1.0			
727	2752	5.1	- 2.0			
700	3060	2.9	- 1.3			

Ascn 353 3 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	96					
961	428	6.7	6.7	Sfc	250	2.1
950	523	6.6	6.6	150	252	0.1
941	601	6.5	6.5	300	324	0.7
900	966	4.1	3.1			
874	1204	2.6	1.1	500	269	0.7
860	1334	2.6	-15.5	1000	318	5.4
850	1429	4.1	-14.7	1500	297	11.9
847	1458	4.4	-15.0	2000	264	15.3
811	1812	4.5	-12.9			
800	1923	4.0	-13.8			
750	2445	1.4	-17.5			
700	2998	- 1.3	-22.0			

Ascn 354 3 November 1971 1359 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	75					
959	428	12.2	0.6	Sfc	280	6.7
950	507	11.3	0.7	150	282	11.8
900	954	5.9	- 2.2	300	283	10.6
881	1128	3.7	- 3.6			
850	1418	1.2	- 4.7	500	281	11.5
800	1903	- 2.9	- 6.9	1000	278	14.2
753	2379	- 7.0	- 9.3	1500	280	10.1
750	2410	- 7.1	-10.0	2000	273	12.6
728	2642	- 8.8	-16.7			
700	2945	-10.0	-20.3			

Ascn 355 4 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	130					
964	428	0.0	- 3.6	Sfc	240	2.1
950	546	1.5	- 3.2	150	270	11.3
948	563	1.7	- 3.2	300	271	14.4
900	979	- 2.0	- 4.4			
853	1402	- 6.1	- 6.1	500	265	8.2
850	1430	- 6.3	- 6.3	1000	275	19.3
800	1901	-10.0	-10.2	1500	276	19.4
776	2136	-12.0	-12.5	2000	275	22.5
755	2345	-13.5	-17.9			
750	2396	-13.4	-18.7			
727	2633	13.2	-24.9			
700	2920	-15.6	-26.8			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 356 4 November 1971 1255 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	172					
969	428	4.4	-8.0	Sfc	250	8.2
950	589	3.1	-8.0	150	261	13.2
900	1024	-1.0	-9.2	300	256	9.7
850	1476	-5.1	-10.7			
804	1910	-9.3	-13.3	500	259	12.8
800	1949	-9.4	-13.9	1000	265	11.3
798	1968	-9.5	-14.2	1500	282	12.6
754	2405	-12.4	-16.5			
750	2445	-12.1	-16.9			
728	2673	-11.4	-26.8			
700	2973	-13.4	-27.4			

Ascn 357 5 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	234					
976	428	-3.3	-3.3	Sfc		0.0
967	502	0.6	-3.5	150	214	3.4
950	644	1.3	-4.8	300	246	7.2
941	721	1.8	-5.6			
900	1079	-1.0	-8.5	500	187	2.0
874	1312	-2.8	-10.4	1000	256	7.7
859	1449	-1.5	-18.6	1500	261	11.3
850	1533	-1.9	-18.9	2000	261	14.0
800	2014	-3.9	-23.1	2500	289	8.6
783	2183	-4.6	-24.2	3000	300	12.6
750	2522	-5.0	-23.0			
700	3063	-5.9	-20.8			

Ascn 358 5 November 1971 1342 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	178					
975	428	11.1	-8.2	Sfc	140	2.1
950	644	8.9	-8.6	150	182	3.3
900	1087	4.1	-10.8	300	174	2.8
874	1324	1.6	-11.6			
852	1530	2.9	-12.6	500	176	1.9
850	1549	2.7	-12.4	1000	181	5.0
813	1908	0.0	-10.6	1500	173	3.1
800	2037	0.0	-9.7	2000	186	3.7
750	2554	-0.5	-9.4	2500	241	5.4
738	2683	-0.7	-9.1	3000	250	8.3
700	3104	-2.3	-10.9			

Ascn 359 6 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	202					
973	428	5.6	-4.8	Sfc	160	3.6
951	616	7.6	-6.9	150	188	8.7
950	624	7.6	-6.9	300	216	16.2
900	1068	5.9	-7.4			
868	1364	4.6	-7.9	500	166	6.2
850	1534	3.0	-8.7	1000	228	17.3
814	1883	-0.1	-9.3	1500	244	17.0
802	2002	-0.6	-11.1	2000	252	16.3
800	2022	-0.3	-11.1	2500	234	14.6
775	2276	0.5	-14.7	3000	233	14.5
750	2539	-0.4	-11.8			
700	3089	-2.7	-8.6			

Ascn 360 6 November 1971 1330 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	255					
970	428	14.4	-1.2	Sfc	200	8.3
950	603	12.7	-2.0	150	206	11.0
900	1053	8.0	-4.5	300	217	8.6
869	1341	5.1	-5.6			
850	1521	4.0	-7.5	500	203	9.7
815	1862	2.0	-10.5	1000	212	10.5
800	2012	2.0	-10.2	1500	227	14.8
788	2134	2.1	-10.1	2000	228	24.5
753	2500	0.6	-16.8	2500	233	27.3
750	2532	0.4	-15.2	3000	233	19.9
727	2781	0.6	-7.9			
700	3083	-1.9	-9.5			

Ascn 361 9 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	226					
975	428	-4.0	-8.9	Sfc	090	1.5
950	633	-3.0	-8.7	150	130	8.6
938	734	-2.5	-8.6	300	147	11.1
900	1061	-4.0	-12.2			
894	1114	-4.1	-12.5	500	113	6.2
869	1337	-6.3	-16.6	1000	167	8.4
850	1510	-5.4	-19.9	1500	261	3.8
827	1726	-4.7	-24.9	2000	238	8.9
800	1987	-4.7	-21.8			
750	2495	-4.7	-16.3			
738	2622	-4.7	-15.2			
712	2905	-3.5	-25.1			
700	3039	-4.5	-22.1			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 362 9 November 1971 1330 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	185					
970	428	3.9	-10.9	Sfc	240	3.1
950	597	2.2	-11.4	150	241	3.5
900	1030	-1.5	-13.1	300	213	3.6
850	1482	-5.4	-14.5			
849	1491	-5.4	-14.5	500	247	3.5
831	1660	-3.6	-26.6	1000	201	3.1
807	1892	-3.7	-26.7	1500	251	6.1
800	1961	-3.6	-10.7			
792	2040	-3.4	-3.7			
750	2470	-6.0	-8.5			
745	2522	-6.3	-9.1			
700	3009	-7.2	-7.9			

Ascn 363 10 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	168					
968	428	-0.6	-6.4	Sfc	250	5.2
950	578	-1.5	-5.0			
908	937	-3.6	-3.6			
900	1007	-3.6	-3.6			
881	1176	-3.6	-3.6			
850	1458	-5.8	-5.8			
827	1672	-7.5	-7.5			
803	1902	-7.6	-7.6			
800	1931	-7.7	-7.8			
776	2168	-8.8	-8.9			
752	2411	-9.4	-16.8			
750	2432	-9.5	-16.9			
700	2962	-13.2	-25.2			

Ascn 364 11 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	149					
966	428	1.7	-1.4	Sfc	290	3.1
950	562	0.8	-1.6	150	309	5.7
900	995	-2.4	-3.0	300	322	6.2
881	1164	-3.5	-3.5			
862	1337	-2.7	-2.7	500	299	4.6
850	1448	-3.7	-3.7	1000	334	8.7
815	1778	-6.9	-6.9			
800	1923	-7.4	-11.0			
776	2160	-8.4	-20.6			
750	2425	-8.6	-21.1			
741	2519	-8.7	-21.8			
700	2958	-10.5	-22.5			

Ascn 365 12 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	144					
965	428	1.1	-1.0	Sfc	210	4.1
952	538	4.6	3.0	150	228	10.0
950	555	4.7	3.1	300	243	12.7
921	808	4.8	3.3			
900	996	3.5	-1.5	500	218	7.2
881	1169	2.2	-6.7	1000	280	13.7
853	1430	2.4	-9.9	1500	280	16.3
850	1458	2.3	-10.3	2000	287	15.6
815	1797	0.5	-12.6	2500	288	22.1
800	1946	1.1	-12.7			
788	2068	1.7	-12.9			
752	2414	0.5	-12.2			
750	2466	0.1	-12.3			
700	3014	-4.4	-12.8			

Ascn 366 12 November 1971 1330 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	118					
963	428	12.2	-0.7	Sfc	250	7.2
950	542	11.2	-1.2	150	242	7.8
900	989	6.8	-3.2	300	242	7.3
872	1248	4.1	-5.1			
850	1456	3.7	-6.3	500	245	7.7
808	1866	2.5	-10.1	1000	247	11.7
800	1947	2.9	-10.4	1500	270	17.4
783	2121	3.3	-11.1			
750	2469	1.0	-13.9			
723	2763	-0.9	-16.0			
700	3020	-2.5	-12.9			

Ascn 367 13 November 1971 0535 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	90					
960	428	8.9	6.0	Sfc	230	4.1
950	515	8.8	1.5	150	265	8.1
922	762	8.2	2.7	300	275	12.4
900	961	6.8	3.1			
850	1429	3.2	2.3	500	251	6.0
843	1496	2.9	2.5	1000	287	12.0
800	1919	1.4	1.0	1500	278	10.0
793	1990	1.3	0.9	2000	276	18.0
750	2437	-2.6	-3.5			
747	2468	-2.9	-3.9			
733	2619	-1.4	-13.3			
700	2985	-3.2	-11.5			

Table 10. (continued) RADIOSONDE MEASUREMENTS

Ascn 368 15 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	168					
969	428	12.2	6.1	Sfc		0.0
950	594	11.9	7.1	150	245	6.5
900	1046	10.6	9.7	300	244	11.6
895	1093	10.5	10.0			
854	1485	10.3	10.4	500	248	3.5
850	1524	10.1	10.2	1000	258	18.7
805	1976	7.6	7.7			
800	2027	7.0	7.0			
750	2554	2.2	2.1			
744	2619	1.7	1.6			
700	3110	- 0.4	- 1.4			

Ascn 369 16 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	192					
972	428	6.7	5.4	Sfc	270	2.1
950	616	6.1	4.8	150	314	5.2
921	870	5.4	4.1	300	340	8.5
900	1058	4.0	3.1			
854	1483	1.0	1.0	500	290	3.9
850	1521	1.8	0.5	1000	351	11.3
817	1843	6.0	-12.1	1500	341	13.0
800	2016	6.0	-14.2			
755	2490	6.0	-14.7			
750	2544	5.6	-15.1			
700	3105	2.6	-17.6			

Ascn 370 16 November 1971 1330 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	192					
973	428	10.0	2.4	Sfc	330	1.5
950	626	8.4	2.2	150	332	5.2
900	1071	4.7	1.6	300	335	5.8
850	1534	0.9	0.6			
848	1553	0.6	0.3	500	331	3.9
816	1866	6.9	- 6.8	1000	337	5.5
800	2028	6.9	- 7.2			
765	2396	7.0	- 9.4			
750	2559	6.0	-10.3			
700	3121	3.0	-12.5			

Ascn 371 17 November 1971 0540 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	200					
972	428	1.7	1.7	Sfc	090	1.5
954	580	6.6	6.6	150	123	4.1
950	615	6.6	6.5	300	138	4.2
911	959	5.4	2.6			
900	1059	8.1	1.1	500	110	3.4
886	1189	11.1	- 3.8	1000	068	2.6
850	1535	11.2	- 5.3	1500	325	6.2
847	1564	11.3	- 5.7	2000	005	4.0
800	2039	8.3	- 7.0	2500	013	3.6
785	2195	7.2	- 7.6	3000	332	3.6
750	2568	4.5	- 6.7			
700	3127	0.3	- 6.6			

Ascn 372 17 November 1971 1445 EST

P,mb	Z, m	T,°C	Td,°C	H, m	D,deg	S,mps
1000	181					
971	428	16.1	2.2	Sfc	270	1.0
950	613	13.9	1.2	150	275	2.0
908	991	9.7	0.6	300	269	2.5
900	1065	10.1	- 0.4			
874	1309	11.4	- 8.0	500	276	1.6
850	1541	10.1	- 8.1	1000	225	3.3
800	2042	7.2	- 9.2	1500	243	5.0
761	2452	5.0	- 9.6	2000	261	7.5
750	2571	4.0	- 7.8	2500	262	9.4
736	2724	2.8	- 5.8	3000	270	10.3
700	3128	0.9	-19.0			

POWER PLANT OPERATIONAL PARAMETERS

Analyses of the Conemaugh and Keystone coal supplies are presented in Table 11. Although various mines supplied coal to each of the generating stations, daily weighted means were calculated for each source and averaged over all experiment days to obtain a single coal analysis for each station per series. Parameters include moisture, volatile matter, fixed carbon, ash, sulfur, and heat value. The sulfur content is a close approximation to the "as burned" basis with allowance made for rejection of sulfur-containing pyrites. The heat value of the coal is presented in English as well as metric units because of common usage.

Table 11. COAL ANALYSES

Conemaugh Station April 1971 Series	
Moisture, %	4.29
Volatile matter, %	19.73
Fixed carbon, %	54.93
Ash, %	18.26
Sulfur, %	2.79
Btu per pound	12,258
Calories per gram	6,810

Conemaugh Station October 1971 Series	
Moisture, %	4.29
Volatile matter, %	20.63
Fixed carbon, %	54.93
Ash, %	17.81
Sulfur, %	2.34
Btu per pound	12,363
Calories per gram	6,868

Keystone Station October 1971 Series	
Moisture, %	6.47
Volatile matter, %	30.15
Fixed carbon, %	46.35
Ash, %	15.27
Sulfur, %	1.76
Btu per pound	11,805
Calories per gram	6,558

Table 12 contains the hourly operational data of the Conemaugh and Keystone Stations. Included are values of plant load, stack-gas exit temperature and velocity, temperature difference at stack top, SO_2 emission, and heat emission. The nominal period of record extends up to 2 hours before and 1 hour after helicopter or bubbler SO_2 measurements on each series day. When both stacks of one station were emitting, a separate listing is included for each.

The plant load was obtained from the station records and includes total electrical output generated during each hour. Temperature difference at stack top is the difference between stack exit temperature and the 300-meter SBE ambient temperature at the Conemaugh Station, or the 250-meter SBE ambient temperature at the Keystone Station, as determined from the helicopter profiles. The stack exit temperature was not monitored; instead, corrections of 16.7°C (30°F) at Conemaugh and 13.9°C (25°F) at Keystone were subtracted from the effluent temperatures leaving the air heaters.

The equations presented below permit calculation of the remaining three parameters (Carpenter and Blackwell, 1969). The units of the formulas are British because all plant data were so supplied; after calculations were performed, conversion was made to metric units.

The hourly stack-gas exit velocity in feet per second was calculated from the following equation:

$$V = \frac{T_c}{3600\ A_s}\left[H_2O\frac{(359)}{(18)} + CO_2\frac{(359)}{(44)} + N_2\frac{(359)}{(28)} + SO_2\frac{(359)}{(64)} + A_e\frac{(359)}{(29)}\right]\frac{t_s + 460}{32 + 460}$$

where T_c = hourly coal consumption in pounds per hour per unit.

A_s = stack exit area = 581.42 square feet for Conemaugh and Keystone.

t_s = hourly gas temperature leaving stack in degrees Fahrenheit.

32 = standard temperature in degrees Fahrenheit.

460 = conversion to Rankine temperature scale.

3600 = seconds per hour.

H_2O, CO_2, N_2, and SO_2 = series average in pounds per pound of coal as products of combustion.

A_e = series average excess air in pounds per pound of coal required for combustion.

Denominators in parentheses are molecular weights of respective gaseous constituents in whole grams per mole.

359 = conversion factor to British units calculated as follows:

$$\frac{22.414\ \text{liters/mole}}{28.317\ \text{liters/ft}^3} \times 453.59\ \text{g/lb} = 359\ \frac{\text{g(ft3)}}{\text{lb(mole)}}$$

Hourly SO_2 emission from each unit in tons per hour was calculated by means of this formula:

$$SO_2 = \frac{T_c \times \%S \times 2}{2000}$$

where T_c = hourly coal consumption in pounds per hour per unit.
$\%S$ = decimal equivalent of series average percent sulfur in fuel.
2 = mass of SO_2 per unit mass of sulfur.
2000 = pounds per ton.

The final parameter, stack heat emission in British thermal units per second, was computed from the following equation:

$$Q_h = \frac{T_c}{3600} \times \%\,DG \times HV \times \frac{(t_s - t_a)}{(t_g - t_a)}$$

where T_c = hourly coal consumption in pounds per hour per unit.
$\%\,DG$ = decimal equivalent of hourly percent dry gas loss.
HV = series average heat value of fuel in Btu's per pound.
t_s = hourly gas temperature leaving stack in degrees Fahrenheit.
t_g = hourly gas temperature leaving air heaters in degrees Fahrenheit.
t_a = hourly ambient temperature at stack top in degrees Fahrenheit.

Although hourly coal consumption is not included in this volume, it can be approximated for the Conemaugh Station using the ratios of 0.734 and 0.746 pounds of coal per kilowatt hour generated in units 1 and 2 respectively. This amounts to 3.87×10^{-4} and 3.93×10^{-4} grams per calorie for units 1 and 2. The corresponding ratio for unit 1 at the Keystone Station is 0.757 pounds of coal per kilowatt hour or 3.99×10^{-4} grams per calorie.

Table 12. PLANT OPERATIONAL DATA

Legend

Unit 1 or 2 : Designation of unit in operation.
Time, EST : Hour designating preceding 60 minutes.
Load, mw : Total hourly generation in whole megawatts.
T, °C : Stack-gas exit temperature in whole degrees Centigrade.
DT, °C : Difference in whole degrees Centigrade between computed stack-gas exit temperature and ambient temperature at 300 meters above stack base elevation at Conemaugh or 250 meters above stack base elevation at Keystone, as determined from helicopter profiles.
Vel, mps : Stack-gas exit velocity in meters per second to nearest tenth.
SO_2, g/sec : Stack SO_2 emission in whole grams per second.
Cal/sec x 10^6 : Stack heat emission in millions of calories per second to nearest tenth.

Table 12. PLANT OPERATIONAL DATA

Conemaugh Unit 1 21 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	855	122	110	20.4	4418	25.1
0700	859	122	110	20.5	4439	25.2
0800	892	126	114	21.5	4609	26.6
0900	891	128	116	21.6	4604	26.7
1000	891	130	118	21.7	4604	26.8
1100	897	131	119	21.8	4635	27.1
1200	892	129	119	21.7	4609	26.8
1300	894	129	118	21.7	4619	26.9
1400	897	129	119	21.8	4635	27.1
1500	895	129	119	21.8	4625	27.0
1600						
1700						

Conemaugh Unit 2 21 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	516	103	91	11.5	2623	12.2
0700	526	98	86	11.6	2674	11.8
0800	531	106	94	11.9	2699	12.7
0900	531	108	96	12.0	2699	12.8
1000	541	111	99	12.3	2750	13.0
1100	538	111	99	12.2	2734	13.0
1200	540	110	99	12.3	2745	13.0
1300	539	109	99	12.3	2740	13.0
1400	535	109	99	12.2	2719	13.0
1500	534	109	98	12.1	2714	12.9
1600						
1700						

Conemaugh Unit 1 22 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	259	84	83	5.6	1336	5.2
0700	381	91	90	8.4	1966	8.3
0800	434	94	93	9.6	2239	10.0
0900	662	108	106	15.2	3416	17.5
1000	874	119	118	20.7	4510	25.9
1100						
1200						
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 2 22 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	536	100	99	11.9	2739	13.0
0700	536	100	99	11.9	2739	13.0
0800	533	100	99	11.9	2724	13.0
0900	531	101	99	11.9	2714	12.9
1000	525	101	99	11.7	2683	12.8
1100						
1200						
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 1 23 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	851	116	112	20.0	4403	24.9
0700	871	117	113	20.5	4507	25.8
0800	892	121	116	21.2	4615	26.8
0900	893	123	119	21.4	4620	26.9
1000	888	126	120	21.4	4595	26.8
1100	891	127	120	21.6	4610	26.9
1200	866	127	119	20.9	4481	25.8
1300	861	128	118	20.9	4455	25.6
1400	844	127	116	20.4	4367	24.8
1500	833	127	116	20.2	4310	24.3
1600						
1700						

Conemaugh Unit 2 23 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	528	98	94	11.7	2710	12.8
0700	524	97	94	11.6	2689	12.6
0800	526	101	96	11.8	2699	12.8
0900	530	103	99	11.9	2720	13.0
1000	527	106	100	12.0	2705	12.9
1100	531	107	100	12.1	2725	13.0
1200	526	108	100	12.0	2699	12.8
1300	529	109	100	12.1	2715	12.9
1400	523	109	99	12.0	2684	12.6
1500	526	111	99	12.1	2699	12.8
1600						
1700						

Table 12. (continued) PLANT OPERATIONAL DATA

Conemaugh Unit 1 24 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	881	118	111	20.5	4484	25.7
0700	881	118	111	20.5	4484	25.7
0800	886	122	115	20.8	4509	26.1
0900	882	126	118	20.9	4489	26.0
1000	884	124	118	20.9	4499	26.0
1100						
1200						
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 2 24 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	523	98	91	11.5	2662	12.4
0700	531	98	92	11.7	2703	12.7
0800	528	102	95	11.8	2687	12.6
0900	526	106	99	11.9	2677	12.7
1000	524	104	98	11.8	2667	12.5
1100						
1200						
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 1 26 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	911	122	116	21.8	4720	27.6
0600	923	123	117	22.1	4782	28.1
0700	931	124	119	22.4	4824	28.6
0800	928	126	120	22.4	4808	28.5
0900	921	126	120	22.3	4772	28.1
1000	924	126	120	22.3	4787	28.3
1100	923	126	120	22.3	4782	28.2
1200	928	127	121	22.4	4808	28.6
1300	927	127	121	22.4	4803	28.5
1400						
1500						
1600						
1700						

Conemaugh Unit 2 26 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	524	101	95	11.5	2645	12.4
0600	526	101	95	11.6	2655	12.5
0700	528	102	96	11.7	2665	12.6
0800	526	103	98	11.7	2655	12.6
0900	529	104	98	11.8	2670	12.6
1000	522	103	98	11.6	2635	12.4
1100	523	103	98	11.6	2640	12.4
1200	527	104	99	11.7	2660	12.6
1300	526	104	99	11.7	2655	12.6
1400						
1500						
1600						
1700						

Conemaugh Unit 1 28 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	921	127	119	22.2	4746	28.0
0600	918	127	119	22.1	4730	27.9
0700	925	128	120	22.3	4767	28.3
0800	920	128	119	22.2	4741	28.0
0900	927	129	120	22.4	4777	28.3
1000	927	129	119	22.4	4777	28.3
1100	924	128	119	22.3	4761	28.1
1200	927	129	119	22.4	4777	28.3
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 2 28 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	527	106	97	11.8	2675	12.6
0600	529	106	97	11.9	2685	12.7
0700	531	106	98	11.9	2695	12.8
0800	526	106	97	11.9	2670	12.6
0900	530	107	98	11.9	2690	12.8
1000	539	107	98	12.1	2736	13.0
1100	538	107	98	12.1	2731	13.0
1200	535	109	98	12.1	2715	12.9
1300						
1400						
1500						
1600						
1700						

Table 12. (continued) PLANT OPERATIONAL DATA

Conemaugh Unit 1 29 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	915	125	120	21.8	4696	27.7
0600	913	124	119	21.8	4685	27.5
0700	914	124	119	21.8	4691	27.5
0800	917	124	120	21.8	4706	27.8
0900	912	124	120	21.7	4680	27.5
1000	914	124	120	21.8	4691	27.5
1100	915	125	120	21.8	4696	27.7
1200	906	125	120	21.6	4650	27.4
1300	892	124	119	21.2	4578	26.7
1400						
1500						
1600						
1700						

Conemaugh Unit 2 29 April 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	848	121	116	19.5	4233	24.1
0600	846	121	116	19.5	4223	24.0
0700	847	121	116	19.4	4228	24.0
0800	848	121	116	19.5	4233	24.1
0900	852	121	116	19.6	4253	24.2
1000	848	121	117	19.5	4233	24.1
1100	847	121	116	19.5	4228	24.0
1200	847	122	117	19.5	4228	24.1
1300	853	122	117	19.7	4258	24.3
1400						
1500						
1600						
1700						

Conemaugh Unit 1 4 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	917	120	119	21.7	4725	27.9
0600	919	120	119	21.8	4736	28.0
0700	923	121	120	21.9	4756	28.1
0800	913	122	119	21.7	4705	27.6
0900	902	123	119	21.5	4648	27.2
1000	892	126	120	21.4	4596	26.8
1100	917	131	124	22.3	4725	28.0
1200	921	131	124	22.4	4746	28.1
1300	915	132	124	22.3	4715	27.9
1400	919	133	124	22.5	4736	28.1
1500						
1600						
1700						

Conemaugh Unit 1 5 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	931	127	118	22.3	4758	28.1
0600	930	127	118	22.2	4753	28.1
0700	915	128	118	21.9	4676	27.5
0800	929	131	119	22.4	4748	28.1
0900	932	134	120	22.7	4763	28.3
1000	916	136	121	22.4	4681	27.7
1100	921	136	122	22.6	4707	27.9
1200	917	138	123	22.5	4687	27.7
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 1 7 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	930	126	114	22.4	4805	28.3
0700	931	126	114	22.4	4811	28.3
0800	919	127	115	22.2	4749	27.9
0900	918	129	117	22.3	4743	28.0
1000	912	132	118	22.3	4712	27.6
1100	917	135	120	22.6	4738	28.0
1200	913	136	120	22.5	4718	27.7
1300	918	137	120	22.7	4743	28.1
1400	919	138	121	22.8	4749	28.1
1500						
1600						
1700						

Conemaugh Unit 1 10 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	534	102	85	12.5	2868	13.3
0600	635	108	91	15.2	3411	17.0
0700	827	120	101	20.4	4442	24.5
0800	885	126	105	22.2	4753	27.2
0900	909	130	106	23.0	4882	28.1
1000	908	134	106	23.2	4877	28.1
1100						
1200						
1300						
1400						
1500						
1600						
1700						

Table 12. (continued) PLANT OPERATIONAL DATA

Conemaugh Unit 1 11 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	744	115	101	17.6	3881	20.6
0600	804	119	105	19.2	4194	23.1
0700	816	123	109	19.7	4256	23.7
0800	810	126	110	19.7	4225	23.4
0900	822	131	113	20.2	4288	24.0
1000	825	133	115	20.4	4303	24.2
1100	831	134	115	20.7	4335	24.4
1200	879	138	118	22.0	4585	26.5
1300	918	141	120	23.2	4789	28.3
1400						
1500						
1600						
1700						

Conemaugh Unit 1 14 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	894	122	116	19.7	4261	24.7
0600	898	123	117	19.8	4280	25.0
0700	912	126	118	20.2	4347	25.5
0800	914	128	119	20.4	4356	25.6
0900	911	130	120	20.5	4342	25.5
1000	837	127	116	18.7	3989	22.6
1100	749	123	111	16.6	3570	19.3
1200	746	124	111	16.5	3556	19.2
1300	834	130	115	18.7	3975	22.3
1400	904	134	119	20.5	4309	25.2
1500						
1600						
1700						

Conemaugh Unit 2 14 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600						
0700						
0800						
0900						
1000	5	81	69	0.1	26	0.1
1100	149	96	83	3.3	765	2.8
1200	343	102	88	7.7	1760	7.4
1300	523	113	98	12.1	2684	12.6
1400	530	114	99	12.3	2720	13.0
1500						
1600						
1700						

Conemaugh Unit 1 15 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	914	124	110	20.5	4427	25.7
0600	911	124	110	20.5	4413	25.7
0700	913	126	112	20.6	4422	25.7
0800	912	131	115	20.8	4417	25.8
0900	912	134	118	21.0	4417	25.8
1000	914	136	119	21.2	4427	26.0
1100	912	138	120	21.2	4417	25.9
1200	905	139	120	21.2	4384	25.7
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 2 15 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	558	104	90	13.0	2954	14.1
0600	564	104	90	13.2	2986	14.2
0700	559	107	93	13.1	2959	14.2
0800	555	111	96	13.2	2938	14.1
0900	551	114	98	13.2	2917	14.0
1000	550	116	99	13.2	2911	14.0
1100	545	118	100	13.2	2885	13.8
1200	539	119	99	13.1	2853	13.6
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 1 17 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	875	123	113	21.6	4675	26.9
0600	879	123	113	21.7	4696	27.0
0700	854	124	113	21.2	4563	25.8
0800	882	128	116	22.1	4712	27.2
0900	917	133	120	23.3	4899	23.9
1000	917	135	120	23.3	4899	28.9
1100	900	136	120	22.9	4809	28.1
1200	908	137	120	23.3	4851	28.5
1300						
1400						
1500						
1600						
1700						

Table 12. (continued) PLANT OPERATIONAL DATA

Conemaugh Unit 1 19 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	895	131	108	22.2	4706	27.1
0600	875	129	107	21.7	4601	26.3
0700	897	132	110	22.3	4717	27.3
0800	901	136	114	22.6	4738	27.5
0900	29	91	68	0.6	152	0.5
1000	00	00	00	0.0	000	0.0
1100	00	00	00	0.0	000	0.0
1200	00	00	00	0.0	000	0.0
1300						
1400						
1500						
1600						
1700						

Conemaugh Unit 1 20 May 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500	876	129	111	22.3	4736	27.2
0600	879	129	111	22.3	4752	27.3
0700	890	148	114	22.8	4811	27.8
0800	878	134	116	22.6	4747	27.4
0900	906	138	120	23.5	4898	28.7
1000	899	139	120	23.4	4860	28.4
1100	891	139	119	23.2	4817	28.0
1200	898	140	119	23.4	4855	28.4
1300	902	141	118	23.6	4876	28.5
1400	906	142	119	23.8	4898	28.7
1500						
1600						
1700						

Conemaugh Unit 2 18 October 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	861	128	115	21.8	3846	26.4
0700	853	144	115	21.6	3810	21.6
0800	860	128	116	21.7	3841	26.4
0900	887	131	119	22.5	3962	27.7
1000	897	133	119	23.0	4006	28.1
1100	900	134	119	23.0	4020	28.2
1200	895	135	119	22.9	3997	28.1
1300	892	135	119	22.8	3984	27.8
1400						
1500						
1600						
1700						

Conemaugh Unit 2 19 October 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	886	124	108	22.2	3968	27.3
0700	896	126	109	22.5	4012	27.9
0800	886	127	109	22.2	3968	27.6
0900	883	128	110	22.4	3954	27.2
1000	879	132	113	22.4	3936	27.2
1100	889	138	117	23.2	3981	27.8
1200	884	140	118	23.0	3959	27.5
1300	881	141	118	23.1	3945	27.4
1400	876	142	118	22.9	3923	27.2
1500	733	134	109	18.8	3282	21.0
1600						
1700						

Conemaugh Unit 2 20 October 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	469	107	95	11.0	2067	11.3
0700	462	107	94	10.9	2036	11.1
0800	463	107	94	10.9	2041	11.1
0900	447	108	94	10.6	1970	10.6
1000	464	110	95	11.0	2045	11.2
1100	470	111	95	11.2	2071	11.3
1200	475	113	96	11.4	2093	11.4
1300	732	128	110	18.3	3226	20.7
1400						
1500						
1600						
1700						

Conemaugh Unit 2 21 October 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	885	128	115	22.5	3984	27.7
0700	885	129	115	22.5	3984	27.8
0800	884	129	115	22.5	3979	27.6
0900	883	131	116	22.6	3975	27.6
1000	888	134	119	22.9	3997	27.9
1100	880	136	118	22.9	3961	27.5
1200	882	137	118	22.9	3971	27.6
1300	885	138	119	23.2	3984	27.8
1400						
1500						
1600						
1700						

Table 12. (continued) PLANT OPERATIONAL DATA

Conemaugh Unit 2 22 October 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	879	133	117	22.7	3962	27.6
0700	882	133	117	22.8	3976	27.6
0800	885	134	118	22.8	3989	27.9
0900	884	134	118	22.8	3985	27.7
1000	881	135	118	22.7	3971	27.6
1100	882	136	118	23.0	3976	27.6
1200	881	138	118	22.9	3971	27.7
1300	854	137	116	22.2	3850	26.3
1400						
1500						
1600						
1700						

Conemaugh Unit 2 2 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	761	133	110	20.6	3587	23.4
0700	704	130	107	18.9	3319	24.2
0800	638	127	104	17.0	3008	18.3
0900	556	123	100	14.6	2621	15.1
1000	503	122	98	13.2	2371	13.5
1100	527	122	98	13.9	2484	14.1
1200	523	122	98	13.8	2465	13.9
1300	534	123	99	14.0	2517	14.4
1400	551	124	99	14.5	2597	15.0
1500						
1600						
1700						

Conemaugh Unit 2 3 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600						
0700						
0800	694	118	108	17.1	3108	19.5
0900	609	113	103	14.8	2727	16.3
1000	631	115	104	15.4	2826	17.1
1100	629	113	102	15.3	2817	16.7
1200	635	116	104	15.5	2844	17.3
1300	638	117	104	15.7	2857	17.4
1400	659	118	106	16.3	2951	18.2
1500	697	121	108	17.3	3121	19.6
1600						
1700						

Conemaugh Unit 2 4 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	745	113	110	18.1	3332	21.5
0700	752	113	110	18.2	3363	25.1
0800	748	113	110	18.1	3345	21.6
0900	747	113	110	18.1	3341	21.6
1000	746	114	110	18.2	3336	21.5
1100	743	114	109	18.1	3323	21.4
1200	748	115	110	18.3	3345	21.6
1300	719	114	108	17.5	3216	20.5
1400	663	111	105	16.1	2965	21.1
1500						
1600						
1700						

Conemaugh Unit 2 5 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	764	111	106	17.7	3286	21.3
0700	779	111	106	18.2	3351	21.8
0800	623	104	99	14.2	2680	16.0
0900	599	104	98	13.7	2576	15.2
1000	750	114	108	17.6	3226	20.8
1100	786	119	111	18.7	3381	22.3
1200	774	121	111	18.4	3329	21.8
1300	780	124	112	18.7	3355	22.1
1400	759	125	111	18.3	3265	21.3
1500	780	128	112	19.0	3355	22.1
1600						
1700						

Conemaugh Unit 2 6 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	783	118	108	18.6	3382	22.1
0700	787	118	108	18.7	3399	22.4
0800	788	117	108	18.8	3403	22.4
0900	785	119	109	18.7	3390	22.3
1000	783	121	109	18.7	3382	22.2
1100	790	123	110	19.0	3412	22.5
1200	791	126	111	19.2	3416	22.6
1300	780	127	110	19.1	3369	22.1
1400	787	130	111	19.4	3399	22.5
1500	779	131	110	19.2	3364	22.1
1600						
1700						

Table 12. (continued) PLANT OPERATIONAL DATA

Conemaugh Unit 2 9 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	793	109	119	19.0	3532	23.3
0700	774	108	108	18.5	3448	22.5
0800	787	111	111	19.0	3506	23.2
0900	792	113	112	19.1	3528	23.4
1000	801	116	114	19.5	3568	23.8
1100	822	118	115	20.2	3662	24.7
1200	820	119	114	20.2	3653	24.6
1300	809	120	114	20.0	3604	24.1
1400	810	121	114	20.0	3608	24.1
1500						
1600						
1700						

Conemaugh Unit 2 12 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	883	122	113	22.3	4006	27.7
0700	902	123	114	22.8	4092	28.5
0800	893	124	115	22.7	4052	28.2
0900	896	127	118	23.0	4065	28.5
1000	895	129	118	23.0	4061	28.5
1100	891	130	118	23.0	4043	28.2
1200	890	131	118	23.0	4038	28.2
1300	886	132	118	22.9	4020	28.0
1400	894	133	118	23.2	4056	28.3
1500	888	134	118	23.1	4029	28.1
1600						
1700						

Conemaugh Unit 2 13 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	893	131	118	22.7	3988	27.8
0700	894	131	118	22.7	3993	27.9
0800	888	130	118	22.6	3966	27.7
0900	814	126	114	20.4	3636	24.3
1000	834	127	115	21.1	3725	25.2
1100	829	128	115	21.0	3703	25.1
1200						
1300						
1400						
1500						
1600						
1700						

Keystone Unit 1 16 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600						
0700						
0800	860	128	118	22.4	2948	25.9
0900	875	130	119	23.0	2999	26.6
1000	876	131	120	23.0	3003	26.6
1100	868	131	119	22.8	2975	26.3
1200	874	131	119	23.0	2996	26.4
1300	866	132	119	22.7	2968	26.2
1400						
1500						
1600						
1700						

Conemaugh Unit 2 17 November 1971

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
0400						
0500						
0600	816	114	104	20.3	3722	24.7
0700	801	114	104	19.9	3653	24.0
0800	803	115	106	20.0	3662	24.1
0900	821	118	109	20.6	3744	25.1
1000	816	119	110	20.6	3722	24.9
1100	845	124	113	21.5	3854	26.3
1200	818	125	113	20.9	3731	25.1
1300	840	129	115	21.7	3831	26.0
1400	822	131	114	21.3	3749	25.2
1500	837	132	115	21.7	3817	26.0
1600	839	133	115	21.9	3826	26.0
1700	839	133	115	21.9	3826	26.0

Conemaugh Unit 2 17 Nov 1971 (continued)

Time, EST	Load, mw	T, °C	DT, °C	Vel, mps	SO_2, g/sec	Cal/sec x 10^6
1800	836	132	115	21.7	3813	26.0
1900	834	130	115	21.7	3804	25.7
2000	839	129	115	21.7	3826	26.0
2100	835	128	115	21.5	3808	25.9

PART 3 - LAPPES PROJECT SUMMARY

INTRODUCTION

Part 3 presents a summary of activities performed during the five-year LAPPES Project in western Pennsylvania. The three major divisions of effort consisted of: (1) procurement by LAPPES personnel of airborne and ground-based SO_2 measurements of tall stack plumes, supported by extensive meteorological observations; (2) contract and voluntary participation by private research organizations; (3) evaluation of effects of sulfur compounds and other effluents from a large generating station complex on vegetation in the adjoining region.

The specialized air quality and meteorological measurements by LAPPES personnel were obtained during the following eleven sampling periods:

October 1967 LAPPES series : 13- 31 October 1967
March 1968 LAPPES series : 14 March - 12 April 1968
May 1968 LAPPES series : 5 May - 1 June 1968
July 1968 LAPPES series : 25 June - 23 July 1968
October 1968 LAPPES series : 15 October - 7 November 1968
April 1969 LAPPES series : 8 April - 10 May 1969
October 1969 LAPPES series : 9 October - 7 November 1969
April 1970 LAPPES series : 20 April - 15 May 1970
October 1970 LAPPES series : 14 October - 16 November 1970
April 1971 LAPPES series : 21 April - 20 May 1971
October 1971 LAPPES series : 18 October - 17 November 1971

Most of the participation by private research organizations in the Large Power Plant Effluent Study was performed under contract to the Division of Meteorology, Environmental Protection Agency, or its predecessor, the National Air Pollution Control Administration. In Part 3, activities of the contractors and voluntary participants are described, accompanied by individual bibliographies which summarize publications and presentations referring to their participation in the LAPPES Project.

The third major division of LAPPES, the vegetative study, lasted from 1967 through 1971. Descriptions of the various types of air quality and agricultural measurements collected as part of the vegetative study are also included in Part 3.

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LAPPES SERIES SUMMARY

Table 13 contains an individual summary for each of the eleven series conducted during the LAPPES Project. Included in each series summary are designations of the source generating station and unit(s) in operation while plume sampling was in progress. In addition, daily totals are presented of the various types of SO_2 and meteorological measurements which were obtained.

Identification of the source generating station is included only for days on which plume SO_2 measurements were procured by LAPPES personnel. Additional dates are listed in Table 13 for which daily totals of helicopter temperature profiles, pilot balloons, and/or radiosondes are presented; these meteorological data were obtained by LAPPES personnel either in support of participating contractor activities or on days when the weather later proved too restrictive for plume sampling.

Table 13. LAPPES SERIES SUMMARY

Legend

Date : Date of LAPPES series activities.

Keystone
1 2 1&2 : Identification of source generating station and operating unit(s) from which sampled plume was emitted, designated by X in appropriate column. Same identification method for Homer City and Conemaugh Stations.

Cross Sections : Number of plume cross sections obtained.

Peak GLC : X indicates measurement of peak ground-level SO_2 concentrations by helicopter during lengthwise flights under plume.

Instan. GLC : X indicates measurement of instantaneous ground-level SO_2 concentrations by helicopter during crosswind flights under plume.

Bubbler GLC : Number of portable bubblers set out under the plume and subsequently analyzed for 30-minute ground-level SO_2 concentrations.

Temp Profiles : Number of helicopter temperature profiles obtained.

Pilot Balloons : Number of pilot balloon releases.

Radiosondes : Number of radiosonde releases.

Series Summary :

1. Total number of series days during which plume SO_2 measurements were procured, identified by source generating station and operating unit(s).
2. Total number of plume cross sections obtained during series.
3. Total number of series days during which peak GLC were measured.
4. Total number of series days during which instantaneous GLC were measured.
5. Total number of portable SO_2 bubblers set out under plume during series.
6. Total number of helicopter temperature profiles obtained during series.
7. Total number of pilot balloon releases during series.
8. Total number of radiosonde releases during series.

Table 13. SUMMARY OF LAPPES PROJECT

October 1967 LAPPES Series

Date	Keystone			Homer City			Conemaugh			Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
	1	2	1&2	1	2	1&2	1	2	1&2							
Oct 13														3		1
Oct 16														2		
Oct 17	X									2				2		
Oct 20	X									3	X		7	2	6	1
Oct 21	X									3	X	X	6	2	6	2
Oct 22	X										X		6	3	6	2
Oct 23	X									3	X		6	4	8	2
Oct 24	X									3	X		6	4	8	2
Oct 25																1
Oct 26	X									2	X		5	3	6	1
Oct 27	X									3	X		7	3	7	2
Oct 28	X									3	X		7	3	6	2
Oct 29	X									4	X		7	3	6	2
Oct 30	X									3	X		6	4	7	1
Oct 31	X									4	X	X	6	5	8	2
Series Summary	12	0	0	0	0	0	0	0	0	33	11	2	69	43	74	21

Table 13. (continued) SUMMARY OF LAPPES PROJECT

March 1968 LAPPES Series

Date	Keystone			Homer City			Conemaugh			Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
	1	2	1&2	1	2	1&2	1	2	1&2							
Mar 14	X									2	X			4	4	1
Mar 15	X									4	X		8	3	7	2
Mar 16	X									3	X		8	2	3	2
Mar 18	X									4	X	X	8	4	8	2
Mar 19	X									4	X	X		4	5	2
Mar 20	X									3	X		8	2	2	2
Mar 23																1
Mar 25	X									4	X	X	8	4	7	2
Mar 26	X									3	X	X	8	5	6	1
Mar 27	X									3	X	X	8	3	7	2
Mar 28	X									3	X	X	8	3	5	2
Mar 29	X									4	X	X	8	4	7	2
Mar 30	X									3	X	X	8	4	7	2
Apr 1	X									2	X	X	8	3	6	1
Apr 2	X									2	X		8	2	4	1
Apr 3	X									3	X	X	8	4	8	2
Apr 4	X									3	X			2		1
Apr 5																1
Apr 10														9		
Apr 11														8		
Apr 12														12		
Series Summary	16	0	0	0	0	0	0	0	0	50	16	10	104	82	86	29

Table 13. (continued) SUMMARY OF LAPPES PROJECT

May 1968 LAPPES Series

Date	Keystone 1	Keystone 2	Keystone 1&2	Homer City 1	Homer City 2	Homer City 1&2	Conemaugh 1	Conemaugh 2	Conemaugh 1&2	Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
May 5	X									4	X	X		3	5	2
May 6	X									2	X	X	8	4	6	2
May 7	X									4	X	X	8	4	7	2
May 8	X									3	X	X	8	4	9	2
May 9	X									5	X			2	4	2
May 10	X									3	X	X	8	4	6	2
May 11	X									3	X			2	5	2
May 12																1
May 13																1
May 21	X									2				4	3	1
May 22																1
May 23	X									2	X			2	2	2
May 24																1
May 25	X										X	X		1	8	2
May 26	X									3	X	X		4	10	2
May 27	X									2	X	X	8	3	6	2
May 28	X									3	X			3	9	2
May 29	X									1				1	9	2
May 30														1	2	1
May 31														2	6	2
Jun 1	X									2	X			2	4	1
Series Summary	15	0	0	0	0	0	0	0	0	39	13	8	40	46	101	35

Table 13. (continued) SUMMARY OF LAPPES PROJECT

July 1968 LAPPES Series

Date	Keystone 1	Keystone 2	Keystone 1&2	Homer City 1	Homer City 2	Homer City 1&2	Conemaugh 1	Conemaugh 2	Conemaugh 1&2	Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
Jun 25																1
Jun 26																1
Jun 27																1
Jun 28																1
Jun 29	X									3	X	X	8	4	8	2
Jun 30	X									3	X		8	3	7	2
Jul 1	X									3	X	X	8	4	8	1
Jul 2																1
Jul 3			X							3	X	X	8	3	8	2
Jul 4	X									2	X			3	4	2
Jul 5			X							3	X	X	8	4	9	2
Jul 6			X							3	X	X		4	9	2
Jul 8			X							3	X	X		5	8	2
Jul 9			X							3	X	X	8	4	7	2
Jul 10			X							3	X	X		3	8	2
Jul 14			X							3	X	X		4	7	2
Jul 15										3						1
Jul 16																1
Jul 17			X							2	X			3	3	1
Jul 18																1
Jul 19			X							3	X			3	6	2
Jul 21	X									4	X	X	7	4	8	2
Jul 22			X							3	X	X		4	9	2
Jul 23																1
Series Summary	5	0	10	0	0	0	0	0	0	44	15	11	55	55	109	37

Table 13. (continued) SUMMARY OF LAPPES PROJECT

October 1968 LAPPES Series

Date	Keystone 1	Keystone 2	Keystone 1&2	Homer City 1	Homer City 2	Homer City 1&2	Conemaugh 1	Conemaugh 2	Conemaugh 1&2	Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
Oct 15															4	2
Oct 16		X								3	X	X		5	8	2
Oct 17		X								3	X	X	6	4	9	2
Oct 18		X								3	X			4	9	2
Oct 20		X								3	X	X	6	5	10	2
Oct 21		X								3	X	X	8	4	10	2
Oct 22		X								3	X	X	8	5	10	2
Oct 23		X								3	X	X	8	3	9	2
Oct 24		X								3	X			4	9	2
Oct 25		X								3				2	3	1
Oct 26		X								3	X	X	8	3	6	2
Oct 28																1
Oct 29		X								3	X	X	8	2	2	2
Oct 30		X								3	X	X		3	7	2
Oct 31		X								2	X	X	8	4	11	2
Nov 1		X								3	X	X	8	4	10	2
Nov 2		X								2	X	X		3	8	2
Nov 4																1
Nov 5																1
Nov 6																1
Nov 7																1
Series Summary	0	15	0	0	0	0	0	0	0	43	14	12	68	55	125	36

Table 13. (continued) SUMMARY OF LAPPES PROJECT

April 1969 LAPPES Series

Date	Keystone			Homer City			Conemaugh			Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
	1	2	1&2	1	2	1&2	1	2	1&2							
Apr 8			X							2	X	X	8	4	5	2
Apr 9		X								3	X	X	8	5	10	2
Apr 10		X								3	X	X	9	4	6	2
Apr 11	X									3	X	X	9	4	9	2
Apr 12	X									1	X	X	9	4	6	2
Apr 14	X									3	X	X	9	5	9	2
Apr 15	X									3				2	2	2
Apr 17	X									3	X	X	9	4	7	2
Apr 18	X									3	X			3	5	2
Apr 28		X								3	X	X	8	4	3	1
Apr 29																1
Apr 30			X								X	X	10	6	9	2
May 1			X							3	X	X	10	6	10	2
May 2			X							3	X	X	10	5	10	2
May 3			X							3	X	X	10	4	8	2
May 5			X							3	X	X	6	6	9	2
May 6			X							2	X	X	10	7	10	2
May 7			X							3	X	X	10	4	7	2
May 8			X							2	X	X		3		1
May 9			X								X	X				1
May 10																1
Series Summary	6	3	10	0	0	0	0	0	0	46	18	17	135	80	125	37

Table 13. (continued) SUMMARY OF LAPPES PROJECT

October 1969 LAPPES Series

	Keystone			Homer City			Conemaugh			Cross	Peak	Instan.	Bubbler	Temp	Pilot	Radio-
Date	1	2	1&2	1	2	1&2	1	2	1&2	Sections	GLC	GLC	GLC	Profiles	Balloons	sondes
Oct 9		X								3	X	X	10	5	7	2
Oct 10		X								3	X	X	10	4	8	2
Oct 11				X						3	X	X	10	5	9	1
Oct 13				X						2	X	X	10	5	10	2
Oct 14																1
Oct 15				X						3	X	X	10	4	11	2
Oct 17				X						2	X		10	2	3	2
Oct 18				X						3	X	X	10	3	8	2
Oct 20				X						3	X	X	9	4	4	
Oct 21				X						3	X	X	9	4	6	2
Oct 23														1	2	1
Oct 24				X						3	X	X		3	9	2
Oct 25																1
Oct 28		X								3	X	X	9	4	9	1
Oct 29		X								2	X	X	10	4	7	2
Oct 30		X								2	X			2	2	1
Oct 31		X								2	X	X	10	4	8	2
Nov 1		X								2	X			2	1	1
Nov 3																1
Nov 6				X						2	X	X	10	4	9	2
Nov 7																1
Series Summary	0	7	0	9	0	0	0	0	0	41	16	13	127	60	113	31

Table 13. (continued) SUMMARY OF LAPPES PROJECT

April 1970 LAPPES Series

Date	Keystone 1	Keystone 2	Keystone 1&2	Homer City 1	Homer City 2	Homer City 1&2	Conemaugh 1	Conemaugh 2	Conemaugh 1&2	Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
Apr 20					X					2	X	X	9	5	9	1
Apr 21						X				2	X		9	3	6	1
Apr 22						X				2	X	X	9	5	10	2
Apr 23						X				3	X			2	3	1
Apr 24						X				3				1	4	
Apr 25						X				2	X	X	10	3	9	2
Apr 27						X				2	X	X	10	5	10	2
Apr 28						X				5	X	X	10	4	9	2
Apr 29														1	1	2
Apr 30						X				3	X	X	10	5	9	2
May 1						X				3	X	X	10	4	10	2
May 2															1	1
May 4						X				3	X	X	10	4	11	2
May 5						X					X	X	10	4	10	2
May 6														2	3	1
May 7														1	5	1
May 8				X						3	X	X	10	5	9	2
May 9				X						3	X	X	10	4	10	2
May 11				X						2	X	X	10	4	11	2
May 12				X						2	X	X	10	3	10	2
May 13														2	3	2
May 15				X						3				2	5	2
Series Summary	0	0	0	5	1	11	0	0	0	43	15	13	137	69	158	36

Table 13. (continued) SUMMARY OF LAPPES PROJECT

Date	Keystone 1	Keystone 2	Keystone 1&2	Homer City 1	Homer City 2	Homer City 1&2	Conemaugh 1	Conemaugh 2	Conemaugh 1&2	Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
									October 1970 LAPPES Series							
Oct 14							X			3	X	X	9	4	7	2
Oct 15																1
Oct 16							X			4	X		10	5	9	2
Oct 17							X			2			9	3	8	2
Oct 20							X			2	X	X	9	4	8	1
Oct 22																1
Oct 23																1
Oct 24																1
Oct 26							X			1	X	X	10	4	5	2
Oct 27							X			3	X	X	9	4	8	1
Oct 28							X			2	X	X	9	4	8	2
Oct 29							X				X	X	10	6	6	2
Oct 30							X				X	X	9	1	2	1
Oct 31																1
Nov 2							X			3	X	X	9	5	9	2
Nov 4																1
Nov 5							X			3	X	X	10	4	8	2
Nov 6							X			2	X	X		2	4	1
Nov 7																1
Nov 9				X						3	X	X	10	4	8	2
Nov 10							X				X	X	10	3	9	2
Nov 11							X			3	X	X		3	3	1
Nov 16							X				X	X		1	1	
Nov 16					X					3	X	X		2	4	
Series Summary	0	0	0	1	1	0	15	0	0	34	16	15	123	59	107	32

Table 13. (continued) SUMMARY OF LAPPES PROJECT

April 1971 LAPPES Series

Date	Keystone 1	Keystone 2	Keystone 1&2	Homer City 1	Homer City 2	Homer City 1&2	Conemaugh 1	Conemaugh 2	Conemaugh 1&2	Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
Apr 21									X	3	X	X	10	3	8	2
Apr 22									X	2	X	X		2	3	2
Apr 23									X	1	X	X	10	4	9	2
Apr 24									X	2	X		4	3	5	1
Apr 26									X	2	X	X	10	4	7	2
Apr 28									X	2	X	X	10	2	3	
Apr 29									X	1	X		10	2	5	2
Apr 30																1
May 1																1
May 3																1
May 4							X			2	X	X	10	4	9	2
May 5							X			2	X	X	10	3	8	2
May 6																1
May 7							X				X	X	10	3	5	1
May 8																1
May 10							X			2	X	X	10	4	10	2
May 11							X			1	X	X	10	4	9	2
May 12																1
May 13																1
May 14									X	1	X	X		5	10	2
May 15									X		X	X	10	4	8	2
May 17							X				X	X		2	4	2
May 18																1
May 19							X			2	X	X	10	3	6	1
May 20							X			3	X	X	8	4	7	2
Series Summary	0	0	0	0	0	0	8	0	9	26	17	15	132	56	116	37

Table 13. (continued) SUMMARY OF LAPPES PROJECT

October 1971 LAPPES Series

Date	Keystone			Homer City			Conemaugh			Cross Sections	Peak GLC	Instan. GLC	Bubbler GLC	Temp Profiles	Pilot Balloons	Radio-sondes
	1	2	1&2	1	2	1&2	1	2	1&2							
Oct 18								X		2	X	X	10	4	9	2
Oct 19								X		3	X	X	10	5	9	2
Oct 20								X		1	X	X	10	4	10	2
Oct 21								X		1	X	X	9	3	9	2
Oct 22								X		2	X	X	10	4	9	2
Oct 23																1
Oct 25																1
Oct 26																1
Oct 27																1
Oct 28																1
Oct 29																1
Oct 30																1
Nov 1																1
Nov 2								X		1	X	X	10	2	6	2
Nov 3								X		1	X	X	10	4	10	2
Nov 4								X		1	X	X	10	2	8	2
Nov 5								X		3	X	X	10	4	10	2
Nov 6								X		4	X	X	10	4	10	2
Nov 9								X		4	X	X	10	4	10	2
Nov 10																1
Nov 11																1
Nov 12								X		3	X	X	10	4	9	2
Nov 13								X		2	X	X		3	7	1
Nov 15																1
Nov 16	X									3	X	X		4	10	2
Nov 17								X		3	X	X	14	6	6	2
Series Summary	1	0	0	0	0	0	0	14	0	34	15	15	133	57	132	40

CONTRACT AND VOLUNTARY PARTICIPATION IN LAPPES PROJECT

During the five-year LAPPES Project, contract and voluntary participation by private research organizations played a significant role. The services of six contractors were engaged by NAPCA and EPA to collect and analyze data pertaining to the dispersion, chemistry, and washout of the SO_2 and/or cooling tower plumes. Two voluntary participants, while conducting their own research, also provided data of interest. In the following section, activities of the contractors and voluntary participants are described, accompanied by individual bibliographies which summarize publications and presentations referring to their participation in the LAPPES Project.

These descriptions are intended to be procedural only; therefore, no attempt is made to summarize data or results. Such information may be obtained by referring to the contractors' final reports or related publications.

Stanford Research Institute

During the May and October 1968 LAPPES series, a team of scientists from Stanford Research Institute (SRI) of Menlo Park, California, used a mobile SRI Mark V neodymium lidar (laser radar) to measure plume rise, plume geometry, and plume particulate concentration distributions at various distances from the Keystone stacks. During the April 1970 series, SRI personnel procured similar measurements of the Homer City plume by means of a mobile SRI-NAPCA Mark VIII ruby lidar. SRI participation in all three series was performed under contract with NAPCA.

The lidar cross sections were obtained by means of a vertical scanning technique with elevation angle increments of 0.3° to 10.0°, depending upon the vertical extent of the plume. Such scans were accomplished by positioning the lidar van to the side of the plume and scanning perpendicular to its mean centerline and at 45° on either side of the perpendicular, thus obtaining three cross sections from a single location. A complete vertical scan of 20 to 30 lidar shots required about 2 to 5 minutes to complete and a set of three cross sections was obtained in 10 to 15 minutes.

The lidar was also used to check plume continuity by procuring cross sections at fixed distances downwind and at specific time intervals (as frequent as 5 minutes apart) during an entire day, beginning with the morning stable period and ending with the onset of evening stability.

The lidar data were recorded on both a video magnetic disk recorder and on an oscilloscope equipped with a 35-millimeter recording camera. A second oscilloscope used in conjunction with the disk recorder permitted visual monitoring of each lidar shot. The 35-millimeter film records were used for manual analyses while computer analyses employed the magnetic disk records.

Supporting meteorological data supplied by LAPPES personnel for the SRI experiments included helicopter temperature profiles and double-theodolite pilot balloons at the source generating station and radiosondes and surface observations at Jimmy Stewart Airport.

The following bibliography summarizes SRI publications and presentations pertaining to their participation in the LAPPES Project.

Johnson, W. B., 1969: Lidar Applications in Air Pollution Research and Control. *Journal of the Air Pollution Control Association*. 19:176-180.

Johnson, W. B., 1969: Lidar Observations of the Diffusion and Rise of Stack Plumes. *Journal of Applied Meteorology*. 8:443-449.

Johnson, W. B., 1970: Lidar Applications in Air Pollution Problems. Presented at Conference on Laser Radar Studies of the Atmosphere. Ocho Rios, Jamaica.

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Johnson, W. B., and E. E. Uthe, 1969: Final Report - Lidar Study of Stack Plumes. Stanford Research Institute. Menlo Park, California. NAPCA Contract No. PH 22-68-33.

Johnson, W. B., and E. E. Uthe, 1971: Lidar Study of the Keystone Stack Plume. *Atmospheric Environment*. 5:703-724.

Johnson, W. B., and W. E. Evans, 1970: Lidar Measurements of Plume Diffusion from Tall Stacks. Presented at Conference on Laser Radar Studies of the Atmosphere. Ocho Rios, Jamaica.

Sign X Laboratories, Incorporated

Under contract to NAPCA, a meteorologist from Sign X Laboratories, Incorporated, of Essex, Connecticut, used an instrumented Bell Model 47G helicopter to measure plume rise at the Keystone Generating Station during the May and October 1968 LAPPES series. Instrumentation used in the Sign X helicopter was similar to that in the LAPPES helicopter with one exception: in addition to continuous recordings of sulfur dioxide, pressure-height, temperature, and wet-bulb depression, a space charge derivative unit was operated to detect charged particulates in the plume. This enabled simultaneous estimates of plume dimensions during each traverse of both particulates and SO_2.

The flight pattern used to define plume rise included both slanting and horizontal traverses through the plume. The slanting traverses began about 6 to 8 kilometers downwind and consisted of a series of climbing and descending passes through the densest part of the plume, toward the stacks. The horizontal traverses, constituting a cross section, were made at fixed distances downwind. Beginning at the top of the plume, successive traverses at 60-meter intervals were made until the bottom was reached; occasionally, this was followed by a series of ascending horizontal passes through the plume in between the levels of descending traverses.

Supporting meteorological data for these experiments included helicopter temperature profiles by the Sign X helicopter at the Keystone Station. LAPPES personnel provided double-theodolite pilot balloons at Keystone and radiosondes and surface observations at Jimmy Stewart Airport.

The following bibliography summarizes Sign X publications and presentations pertaining to their participation in the LAPPES Project.

Proudfit, B. W., 1970: Final Report - Plume Rise from Keystone Plant. Sign X Laboratories, Incorporated. Essex, Connecticut. NAPCA Contract No. PH 86-68-94.

Proudfit, B. W., 1970: Behaviour of Hot Plumes under Stable Conditions. Presented at North American Fuel Technology Conference. Ottawa, Canada.

Meteorology Research, Incorporated

Also under contract to NAPCA, personnel from Meteorology Research, Incorporated (MRI), of Altadena, California, flew an instrumented Aztec C to obtain particle size distribution and turbulence measurements in the Keystone plume during the October 1968 LAPPES series.

Airborne determination of the flyash concentration and size distribution were procured for comparison with concurrent lidar observations being conducted by SRI. Using an MRI moving slide impactor and continuous particle collector, measurements were made of flyash particle size in both the "dirty" and "clean" plumes at Keystone, dirty referring to 50 percent passage of flyash out the stack and clean denoting all precipitators in operation. Airborne measurements with a universal turbulence indicator system were made under various meteorological conditions in the Keystone plume and in the vicinity of the Homer City and Conemaugh Generating Stations, then under construction.

The flight pattern used for measurements of both parameters at Keystone consisted of lengthwise flights in the plume from 16 kilometers downwind to the stacks and of successive horizontal traverses through the plume at 3.2, 8.0, and 16.0 kilometers downwind. Spiral soundings at the plant and 16 kilometers downwind were executed to provide meteorological conditions and background particle samples.

Besides the aircraft observation, MRI personnel operated a ground-based camera sequentially photographing the Keystone plume from a position perpendicular to its centerline. The photographs were obtained to provide plots of plume sizes and position for comparison with theoretical predictions of plume rise and for comparison of the usefulness of the photographic technique with the lidar method.

In addition to the temperature profiles by the MRI Aztec, supporting meteorological data provided by LAPPES personnel included helicopter temperature profiles and double-theodolite pilot balloons at the Keystone Station and radiosondes and surface observations at Jimmy Stewart Airport.

The following bibliography summarizes MRI publications and presentations pertaining to their participation in the LAPPES Project.

Day, M. C., 1969: Photographic Measurement of the Transport and Diffusion of Effluent from an 800-foot Stack. Presented at Annual Joint Convention and Trade Show of the American Society of Photogrammetry and the American Congress of Surveyors and Mappers. Portland, Oregon.

Niemann, B. L., M. C. Day, and P. B. McCready, Jr., 1970: Final Report - Particulate Emissions, Plume Rise, and Diffusion from a Tall Stack. Meteorology Research, Incorporated. Altadena, California. NAPCA Contract No. CPA 22-69-20.

Illinois Institute of Technology Research Institute

Personnel from the Illinois Institute of Technology Research Institute (IITRI) of Chicago, Illinois, conducted a two-phase study of cooling tower plumes at the Keystone Generating Station during 1969. The purpose of their study was to describe and evaluate potential effects on the local environment, climate, and nearby generating station smoke plumes that resulted from cooling tower emissions of water vapor and heat. IITRI participation was performed under contract with NAPCA.

During September 1969, a ground-based survey was executed in the vicinity of Keystone to evaluate the heat and water balances through the cooling towers. The airborne phase of IITRI's study was conducted in November and December 1969 and involved the use of an instrumented Bell Model 47J2 helicopter. Airborne measurements permitted the determination of ambient and plume temperature and humidity profiles; background and plume sulfur dioxide concentrations by means of a Davis SO_2 monitor; and size and acidity of plume droplet samples collected by Casella cascade impactors.

The helicopter flight pattern used to collect the data was initiated by a vertical ascent upwind of the Keystone Station to determine the temperature-humidity profile and background SO_2 concentrations. This was followed by successive horizontal traverses through the cooling tower plume at various distances downwind of the visible portion. A low-level flight lengthwise under the plume toward the towers completed the standard flight pattern. Plume droplet samples were collected along the edges of the visible plume.

In addition to the temperature profiles by the IITRI helicopter, supporting meteorological data for these experiments provided by LAPPES personnel consisted of surface observations at Jimmy Stewart Airport. Additional surface and upper air wind data and precipitation records were utilized from stations within an 80-kilometer radius of the Keystone Station.

The following bibliography summarizes IITRI publications and presentations pertaining to their participation in the LAPPES Project.

Aynsley, E., 1970: Cooling Tower Effects - Studies Abound. Electrical World. 19:42-43.

Aynsley, E., 1970: Environmental Aspects of Cooling Tower Plumes. Presented at Cooling Tower Institute Meeting. New Orleans, Louisiana.

Aynsley, E., 1970: Cooling Towers, the Environment and the Future. Presented at Cooling Tower Institute Meeting. Snowmass-at-Aspen, Colorado.

Stockham, J., 1971: Final Report - Cooling Tower Study. Illinois Institute of Technology Research Institute. Chicago, Illinois. NAPCA Contract No. CPA 22-69-122.

Battelle Memorial Institute, Pacific Northwest Laboratory

Under contract to NAPCA, a team of scientists from Battelle Memorial Institute, Pacific Northwest Laboratory, of Richland, Washington, collected and analyzed rainfall and snowfall samples under the Keystone plume during three periods, i.e., October-November 1969, February 1970, and April-May 1970. The purposes of the field operations were to determine the scavenging efficiency by natural precipitation of airborne contaminants and to identify the chemical composition of surface-collected precipitation.

Precipitation samples were obtained by arranging collectors in three arcs under the plume at approximate distances of 2.0, 4.0, and 6.5 kilometers downwind. To inhibit the sulfur dioxide loss or chemical reaction, some collectors contained tetrachloromercurate solution. Immediate analyses of the samples in a field laboratory yielded measurements of acidity, sulfur dioxide, sulfates, nitrates, and nitrites. Supplementary ground-based measurements obtained during the experiments included rainfall rate determined by weighing-bucket rain gages; raindrop size and electric charge spectra by means of spectrometers; adsorption of SO_2 on flyash collected with an electrostatic precipitator; ground-level sulfates determined from high-volume air samplers; and photographs of snowflake characteristics.

During the first two sampling periods, an instrumented Cessna 172 was used to provide background and plume measurements of temperature, humidity, and sulfur dioxide. Occasional collection of airborne particulate matter by means of a Unico cascade impactor enabled determinations of particle morphology and size distributions. Because of the severe restrictions imposed by the type of meteorological conditions in which sampling was performed, the aircraft was used only intermittently. The standard flight pattern consisted of successive horizontal traverses through the plume at fixed distances downwind and at vertical intervals of 30 or 60 meters.

Supporting meteorological data obtained by Battelle personnel included single- and double-theodolite pilot balloons and vertical profiles of temperature and humidity at the Keystone Station as well as the previously mentioned measurements pertaining to rate and nature of rainfall and snowfall. LAPPES personnel provided surface observations at Jimmy Stewart Airport.

The following bibliography summarizes Battelle publications and presentations pertaining to their participation in the LAPPES Project.

Dana, M. T., J. M. Hales, and M. A. Wolf, 1972: Final Report - Natural Precipitation Washout of Sulfur Dioxide. Battelle Memorial Institute, Pacific Northwest Laboratory. Richland, Washington. EPA Contract No. AT (45-1)-1830.

Hales, J. M., J. M. Thorp, and M. A. Wolf, 1970: Washout of SO_2 from the Plume of a Coal-Fired Power Plant. Precipitation Scavenging. USAEC Symposium Series. 22:293-303.

Hales, J. M., J. M. Thorp, and M. A. Wolf, 1971: Final Report - Field Investigation of Sulfur Dioxide Washout from the Plume of a Large Coal-Fired Power Plant by Natural Precipitation. Battelle Memorial Institute, Pacific Northwest Laboratory. Richland, Washington. NAPCA Contract No. CPA 22-69-150.

Hales, J. M., J. M. Thorp, and M. A. Wolf, 1971: Theory and Field Measurements of Sulfur Dioxide Washout from an Elevated Plume. Presented at AMS-APCA Conference on Air Pollution Meteorology. Raleigh, North Carolina.

Research Laboratories, French Meteorological Services

A voluntary participant in the LAPPES Project during 1970 and 1971 was Mr. L. Facy, Director of the Research Laboratories of the French Meteorological Services. Using water tunnel facilities located in his Paris laboratory, Mr. Facy initiated a model study of Conemaugh plume dispersion.

His first approach was the construction of a model to duplicate the moderate-to-high wind, neutral-stability case during which the Conemaugh plume traverses Laurel Ridge and Conemaugh Gorge, with emphasis placed on possible channelling through the gorge. If successful, the program's scope would be broadened to study the plume's behavior under gravity-wave action in stably stratified layers over Laurel Ridge. The objectives of both models were to determine the possibility of "fumigating" the lee slopes of Laurel Ridge and the city of Johnstown during episodes of northwest winds, and if it did occur, to locate the areas of maximum ground-level SO_2 concentrations.

During the October 1970 series, LAPPES personnel cooperated in this venture by procuring additional SO_2 and meteorological data. Besides the helicopter temperature profiles flown at the Conemaugh Station, additional profiles were executed over Johnstown to enable a comparison of stability aloft as affected by the ridge. Other specialized measurements included the placement of portable bubblers on both sides of Laurel Ridge and in the Conemaugh Gorge during periods of northwest winds. Additional supporting meteorological data supplied to Mr. Facy included double-theodolite pilot balloons at the Conemaugh Station and radiosondes and surface observations at Jimmy Stewart Airport.

The following bibliography summarizes Mr. Facy's publications pertaining to his participation in the LAPPES Project.

Facy, L., 1971: Pollution Atmospherique - Dispersion et Diffusion des Effluents Rejetes par les Centrales Thermiques de Conemaugh et de Seward dans la Region de Johnstown (Pennsylvania, U.S.A.). Etablissement d'Etudes et de Recherches Meteorologiques, Magny-les-Hameaux, France. Avec la participation et l'assistance de OSIB-SECURIPOL.

Brookhaven National Laboratory

Participation in the LAPPES Project by Brookhaven National Laboratory of Long Island, New York, was of both a voluntary and contract nature. During 1968 and 1969, Brookhaven personnel used a fixed-wing aircraft to collect Keystone plume samples for isotopic analysis. The S_{32}/S_{34} ratios in these samples were compared to the corresponding ratio in the supply coal in an attempt to establish a correlation. In addition to collecting plume samples, Brookhaven scientists performed an aerial infrared mapping of vegetation in the local area during 1968.

Under contract to EPA, Brookhaven participated in the LAPPES Project during October and December 1970 and May, October, and November 1971. During these periods, Brookhaven personnel used a fixed-wing aircraft to procure airborne measurements pertaining to plume geometry and plume chemistry.

By means of an on-board densitometer using right-angle scattering with maximum sensitivity at 0.6 microns, flyash particles in the 0.01 to 10 micron diameter range were detected during successive crosswind flights downwind, thus providing a means of defining plume geometry. In support of efforts to determine SO_2 reactions in the plume aloft, controlled amounts of sulfur hexaflouride (SF_6) were released into the stack effluent. Evacuated flasks fitted with critical orifices were used for airborne collection. In order to obtain crosswind integrated values of SF_6, one continuous sample was obtained during each horizontal plume traverse. Subsequent gas chromatograph analyses of the samples will provide data with which simultaneous airborne SO_2 measurements can be compared and chemical reactions determined.

While the airborne operations were in progress, ground-level SF_6 concentrations and densitometer background information were being simultaneously collected. In addition to the vertical temperature profiles and pilot balloon data obtained by Brookhaven, supporting meteorological data provided by LAPPES personnel included helicopter temperature profiles and pilot balloons at the Keystone Station and radiosondes and surface observations at Jimmy Stewart Airport.

Although a final report is not yet available, the following bibliography summarizes Brookhaven publications and presentations pertaining to their participation in the LAPPES Project.

Brown, R. M., L. A. Cohen, and M. E. Smith, 1971: The Diffusion of Large Plumes. Presented at AMS-APCA Conference on Air Pollution Meteorology. Raleigh, North Carolina.

Brown, R. M., L. A. Cohen, and M. E. Smith, 1972: Diffusion Measurements in the 10-100 km Range. Journal of Applied Meteorology. 11:323-334.

Tucker, W. D., 1969: The Atmospheric Diagnostic Program at Brookhaven National Laboratory - Second Status Report. Brookhaven National Laboratory. Upton, L.I., New York. BNL 50206 (T-553).

Tucker, W. D., 1970: The Atmospheric Diagnostic Program at Brookhaven National Laboratory - Third Status Report. Brookhaven National Laboratory. Upton, L.I., New York. BNL 50280 (T-606).

LAPPES VEGETATIVE STUDY

The third major division of LAPPES, the vegetative study, was operational from 1967 through 1971. The proposed ten-year investigation was intended to evaluate the effectiveness of tall stacks in preventing injurious effects by sulfur compounds and other effluents on vegetation in the region surrounding the Keystone, Homer City, and Conemaugh Generating Stations. This primary objective was to be accomplished by analysis of vegetation for acute and chronic injury and by measurements of ground-level concentrations of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), oxidants (O_3), hydrocarbons, and aldehydes, supported by a comprehensive meteorological monitoring program. Because of funding and manpower priorities, however, the study was prematurely terminated after only partial results were obtained.

The field project was activated in 1967 with the establishment of 22 monitoring areas consisting of 15 Scotch pine and 7 white pine plots. These areas were located at distances of 8, 16, 32, 48, 64, and 80 kilometers in the prevailing downwind direction (northeast) of the line connecting the three generating stations. Sulfation candles and plates were installed at these locations and leaf samples of both deciduous vegetation and pine trees were collected for sulfate analysis.

A tobacco sensitivity program for determination of air pollution effects was conducted during the summers of 1968 and 1969 at the same monitoring areas. By visual observation of damaged leaf areas, moderate to severe foliage injury was observed in both years as a result of oxidants and/or oxidant mixtures with other pollutants.

The vegetative study was expanded in 1969 to include eight 4- to 6-acre major research areas with similar soil, drainage, and slope characteristics. Six of these sites were located northeast of the Homer City Generating Station at distances of about 2, 11, 22, 34, 50, and 66 kilometers. The remaining two areas were situated between the generating stations at 8 and 11 kilometers northeast of the line traversing the three stations. Within each area, irrigated and non-irrigated plots were developed; irrigated plots were set up to determine effects under conditions of maximum soil moisture. A random plot design was utilized for conifer and deciduous tree species planted in the eight areas. In addition, subplots were established in each area for herbaceous crop species of commercial importance. Plans for data analyses within the research areas included the determination of visible injury and measurement of growth and yield effects.

To obtain correlation between research areas, air monitoring for oxidant, sulfur dioxide, and nitrogen oxides began during the 1969 growing season. Temperature, humidity, solar radiation, and rainfall instrumentation were added in 1970. Wind speed, wind direction, soil temperature, and soil moisture devices were also planned, but were not implemented.

Although the project was never fully operable, vegetational injury from sulfur dioxide and/or oxidants was observed on various tree and herbaceous species throughout the study region. A final report of the vegetative study is being prepared and will be available for additional information.

ACKNOWLEDGMENTS

As the Large Power Plant Effluent Study is terminated, specific mention should be made of the contributions and cooperative efforts of many individuals who helped ensure the success of such a comprehensive project.

Permission for EPA to utilize data and facilities at the Keystone, Homer City, and Conemaugh Generating Stations was granted by the following twelve electric utility companies comprising ownership of the stations:

Atlantic City Electric Company
Baltimore Gas and Electric Company
Delmarva Power and Light Company
Jersey Central Power and Light Company
Metropolitan Edison Company
New York State Electric and Gas Corporation
Pennsylvania Electric Company
Pennsylvania Power and Light Company
Philadelphia Electric Company
Potomac Electric Power Company
Public Service Electric and Gas Company
UGI Corporation

Personnel of the Pennsylvania Electric Company, particularly W. Verrochi, R. Conrad, D. Park, and D. Fyock, provided valuable assistance in the initial and continued execution of LAPPES. The staffs of the Keystone, Homer City, and Conemaugh Stations cooperated in numerous ways, including but not limited to: (1) conducting tours to acquaint EPA personnel with generating station operations; (2) manipulating electrostatic precipitator efficiency to permit limited flyash release, thus enabling visual plume tracking; (3) supplying nonroutine plant operational data during sampling periods; (4) allowing unrestricted access to and publication of station performance and operations data.

On-site EPA personnel, R. Soller, W. Kemp, E. Tillotson, and T. Therkelsen, were instrumental in the collection and reduction of LAPPES data. Additional assistance in the procurement of measurements was provided by several meteorological technicians from the Division of Meteorology, EPA (formerly Air Resources Cincinnati Laboratory, NAPCA). Computer manipulation of data was provided by W. Umfleet. Marianne Proch typed the manuscripts for the four LAPPES data summaries.

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In preparing and conducting the LAPPES experiments, the combined experience of TVA personnel was drawn upon. Specifically, F. Gartrell, F. Thomas, S. Carpenter, and J. Blackwell assisted in the initial planning of LAPPES and in furnishing techniques to reduce plant operational data.

Professors P. Prince, M. Stapleton, F. Liegey, and S. Tackett of the Indiana University of Pennsylvania provided logistical support in establishing the LAPPES field office and on subsequent occasions.

The conduct of LAPPES was continuously monitored by an advisory committee composed of J. Fuquay, D. Pack, R. McCormick, F. Gartrell, M. Smith, H. Panofsky, and D. Lohman. This committee met twice yearly to review current progress and to suggest future activities.

Finally, the personal advice and assistance offered to the Project Meteorologist by R. McCormick, L. Niemeyer, and F. Pooler proved invaluable.

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Schiermeier, F. A. Study of Effluents from Large Power Plants. Presented at American Industrial Hygiene Conference. Toronto, Canada. 1971.

Schiermeier, F. A. Large Power Plant Effluent Study (LAPPES); Volume 3 - Instrumentation, Procedures, and Data Tabulations (1970). U.S. Environmental Protection Agency, Bureau of Air Pollution Sciences, Office of Air Programs. Research Triangle Park, North Carolina. OAP Publication No. APTD-0695. 1971.

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Topographic Maps. U.S. Department of the Interior, U.S. Geological Survey, Washington, D. C. 1971.